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Excursions in Madeira and Porto
during the autumn of 1823
while on his third voyage to Africa
by Late T. Edward Bowdich 1825
London, George B Whittaker 18
to which is added by Mrs B

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THE
ASIATIC SOCIETY OF BOMBAY
Town Hall, Bombay.

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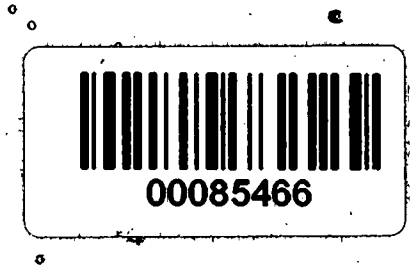
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Pl. 1.

S. Howdich del.

Printed by C. Hullmandel

IN

MADEIRA AND PORTO SANTO

DURING

THE AUTUMN OF 1823,

WHILE ON HIS THIRD VOYAGE

TO

AFRICA;

THE LATE T. EDWARD BOWDICH, Esq

CONDUCTOR OF THE MISSION TO ASHANTEE,

PHILOSOPHICAL SOCIETY, AND MEMBER OF VARIOUS OTHER
TIES BOTH [illegible]IGN AND DOMESTIC.

IS ADDED,

RS. BOWDICH,

I. A N[illegible]NCE OF THE VOYAGE TO ITS COMPLETION, TOGE
WITH THE SU[illegible]URRENCES FROM MR. BOWDICH'S ARRIVAL IN A
TO THE PERIOD OF [illegible]TH.

II. A DESCRIPTION OF THE ENGLISH SETTLEMENTS ON THE RIVER GAMBIA.

III. APPENDIX: CONTAINING ZOOLOGICAL AND BOTANICAL DESCRIPTIONS, AND TRA
TIONS FROM THE ARABIC.

ILLUSTRATED BY

SECTIONS, VIEWS, COSTUMES, AND ZOOLOGICAL FIGUR

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GEORGE [illegible] LANE.

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TO THE

RIGHT HON. EARL BATHURST, K.G.

&c. &c. &c.

My Lord,

I have been induced to hope that this book may, without impropriety, be inscribed to your Lordship, not only because it relates to a Settlement of which you may be considered the appointed Guardian; but, because it is well known that your Lordship, even in the midst of the important duties of your high official station, finds leisure for the encouragement of all laudable attempts towards the extension of general knowledge.

To the honour of your Lordship's patronage I have no other pretension, than that of having shared the fortunes of one, whose short life was zealously devoted to scientific attainments, and to his country's service;

nor have I any other claim to merit, than that of having edited the last remnant of his scientific labours.

To your Lordship, however, I fortunately need not appeal for that kindness which will find excuse for any errors and imperfections in the style and arrangement of the following pages; and the same kindness will prompt you to believe, that, the substance, if defective, might have been amended and improved, had the care of revisal been left to the author himself, rather than to his widow.

With deference therefore, though not without confidence, I submit this work to the Public, under the protection of your Lordship's name, and subscribe myself, with feelings of gratitude and respect,

Your Lordship's

Much Obliged

And most Obedient Servant,

S. BOWDICH.

London, March, 1825.

PREFACE.

WHEN I had corrected the proofs of the concluding sheet of the present volume, I considered that my labour was at an end; but I am told that there must be a Preface, and that I am generally expected to compose it of the memoirs of him whose loss I have so much reason to deplore.

This is a task, however, which I cannot undertake; not because it would add to the poignancy of my sufferings, for my greatest happiness consists in talking or writing of him; in retracing every hour that we passed together, and in repeating all I have ever heard of him before we met. But my reason for declining it is, because his own numerous works are the best pictures of his scientific labours and attainments; and the only part of his life which is not generally known, belongs to his domestic and social virtues. On this subject I dare not trust myself to write, as I might be led by affection and happy retrospect, to expatiate in a manner that would be little interesting to the public.

For the favourable reception of the first part of my book, I feel little or no apprehension. The errors which may have crept in when correcting the press, will justly be laid to my charge,

and cannot deteriorate from its excellence. There, indeed, I have not presumed to make the slightest alteration, not even by compressing the Supplement into the body of the work; feeling perfectly assured, that I had no right to deprive the public of one word, and that all attempts to improve would have been fruitless.

For the second part I claim indulgence, but I do not ask it from the consideration that I am a widow with three orphans to maintain and educate; for, in my opinion, these circumstances form the strongest stimulus to exertion. I have only to entreat the public to consider, that I make my appearance as an Authoress for the first time, and deprived of the aid which would have ensured me success. Accustomed to submit every word and action to my husband, I now feel a diffidence in my own abilities, which fetters rather than promotes my best endeavours.

When I recollect the painful struggles, the numerous privations, the years of intense study, which preceded Mr. Bowdich's third voyage to Africa; when I reflect, that every hope, every wish, that bound us to Europe was sacrificed; that all personal property, and the greatest bodily and mental exertions were devoted to this one cherished object; and when I look at the last part of the volume, to which this is the Preface, I feel concerned at the little apparent result. But when I request my readers to bear in mind, that the little that has been done was completed in the short space of a month, I think they will agree with me, that it is a favourable specimen of what might have been effected, had Mr. Bowdich's life been prolonged.

Although I may deem it necessary to control my feelings in

other respects, to the sentiments of gratitude, there need be no restraint; and to those who sympathized with me in my affliction, and met my returning orphans with their bounty, let me offer these sentiments, with an assurance, that they will never be effaced from my memory, unless the events which occasioned them can also be obliterated.

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EXCURSIONS

IN

MADEIRA AND PORTO SANTO,

&c.

CHAPTER I.

Observations on Portuguese Government.—Geological Excursions in the Environs of Lisbon.—Aqueduct.—Fishes.—Almada.—Shells. Voyage to Madeira.—Fellow Passengers.—Gull.—Fishes and Molluscæ.

HAVING devoted the three years and a half which had elapsed since my publication of the Mission to Ashantee, to a patient study of physical science and natural history, I became anxious, on the extinction of the African Committee, and the formation of the new government for the Gold Coast, to repair to Sierra Leone, with the view of making myself useful, if permitted to do so. I determined, however, to proceed to Lisbon, in the first instance; in the hope of getting access to some MSS. in the public and private archives of that city, which might enable us to form an idea of the extent of the Portuguese discoveries, establishments, commerce, and influence, in the interior of Congo, Angola, Benguela, and Mozambique. Although furnished with very strong letters to distinguished individuals at Lisbon, the difficulties

opposed to me were so various, that, notwithstanding every effort on the part of my friends there, it was nearly a month before I had collected the information, which I apprehend must ere this have been laid before the public, and which, scanty as it may seem, is, I have been assured, all that exists on the subject.

It has almost always been the custom with every Portuguese, holding a distinguished appointment, such as that of a minister or governor, to preserve copies of all the despatches and instructions written and received by him during his administration, as well as of every other official document, and to have them bound together on his retirement, and deposited in the family library, like any other historical volume, for his own justification, and for the honour and instruction of his descendants. Thus, much has escaped in manuscript, which would have been condemned by that Inquisition which allowed no man a bible, which authorised the Custom-House to rob the foreigner even of his prayer-book, which stole any man from his family whom a malignant or designing neighbour fee'd them to impale, and which had not even forbearance enough to reply, "Monsieur, vous êtes bien curieux," (as the guard did to a poor Frenchman hurried away to the Bastille,) when their victim dared to entreat an explanation beyond the vague charge of impiety. Some of the nobility, no doubt, as liberal lovers of literature, would always have been ready to open these manuscript volumes, to any inquirer who had desired to throw light on Portuguese diplomacy and Portuguese discoveries, for both of which a blank seems to have been left in modern history;—but the greater number have hitherto been either too narrow-minded and suspicious to do so, or, occupying their whole lives to prove that "Kings have descended from them, and not they from kings"—a vaunt not unfrequently blazoned in letters

* An account of the discoveries of the Portuguese in the interior of Angola and Mozambique.

of gold in the palaces of the provinces, have been ignorant of every volume they possessed beyond their genealogies. At the present moment, however, even these men are disposed to oblige those who are occupied in useful research; not from any generous interest in it, but because they feel themselves just now entirely eclipsed in public life, and therefore endeavour to appear liberal in private, not only in exoneration of themselves, but out of opposition to the constitutionalists.

Not a few, perhaps, of the more enlightened nobility would be disposed to join the better cause, in the hope of gradually inducing a government more worthy of that cause, were it not for the coarseness of manner, vulgarity of language, slovenly habits, and contempt of refinement, whether intellectual or physical, which, though felt by few, has been affected by many of the liberal party, with the short-sighted and unworthy view of pleasing the lower order of their constituents; who, instead of being attached by it, have shrewdly enough construed it into a discovery, that the differences between themselves and their deputies were purely imaginary, and that they might just as well elect one of their own class. If the constitutionalists consider the nobility as an unnatural aristocracy, supported by accident and court favour, and not by superior achievement, virtue, and intelligence,—an aristocracy, which had monopolised all the places of profit, yet almost always remained debtors to the revenue for their unfair proportion of those arbitrary taxes which were squeezed, without abatement out of the hard earnings of the labourer: if they could not help feeling this, they should at least wish the educated gentleman to preserve that sort of dignity, to give that evidence of his superiority, which would warrant the lower class to look up to him with confidence and expectation, and to protect his privileges from attack or intrusion on the part of the more worthless of their own body; as they would do, were it once made manifest that the

combined superiority of character, talent, and education was exerted in their behalf, and for their real good. There are many men who are loth to sacrifice the refinements of intellect and taste, the very barriers of society, to political changes, better in principle, but bearing very little on themselves in immediate effect; and they wisely prefer to be slighted and treated with hauteur in the world by an ignorant nobility, to being invaded in their retirement by the boisterous impertinence, and coarse equality of an unruly mob. The younger members of the present legislative party should endeavour to outvie their noble predecessors in every virtuous refinement, in the classic purity of their language, in the elegance of their private pursuits, in the polish of their manners, in the taste, though not the splendour of their entertainments, nay even in the fashion of their dress, if they would reconcile the nobility to a generous cause, and, by removing their present reasonable apprehensions, avail themselves of so desirable an aid in re-modelling the government. This would be to benefit the country, and to do more than justify themselves. The word gentleman, however, is not understood in France or in Portugal, perhaps not on the continent; there it implies nobility, with us it means a man of honour and education, who, however high or low his birth may be, dares not do that for which the vulgar stand excused; who is admissible to all society, who can command satisfaction from, and appeals to the first nobles of the land, not as a nobleman but a gentleman, and always finds that noble as jealous, and as proud of the title, as himself. This is the only sort of levelling, if it can be called so, tolerated by thinking men; and it is to this perhaps that the English character owes its high reputation: certain it is, that our country owes to it much of her real glory, for this one feeling has created energies unknown on the continent.

I had scarcely finished my extracts from the different despatches, instructions, and reports, received and forwarded by the Governors

of Angola and Mozambique, when I learned that a Portuguese schooner was on the point of sailing for Madeira, and having safely deposited my instruments on board, with the exception of a barometer, I hastened to devote the first day of leisure I had enjoyed, to an excursion in the environs of the aqueduct.

On the right of the descent to the aqueduct are large fragments and rocks, presenting all the characters of transition limestone; here crystalline, there compact, equally variable in fracture; and the outer surface, exposed to the air for ages, passing through all the different shades from red to black, and yielding with difficulty to the hammer, which exposed the buff and white colours pervading the interior of the mass. This fresh surface, where the recent fall of vast blocks exposed it in considerable patches, formed a pleasing contrast to the gloomy appearance which the moisture of the atmosphere had induced over the rest. But few plants had withstood the unusual dryness of the last summer; even the clefts of the rocks were almost destitute of them; and I was much disappointed in my search for lichens and mosses, of which I promised myself a rich harvest. To give some idea, however, of the social plants which characterized the vegetation, I gathered the *cichorium intybus* and the *anagallis arvensis*, as I descended to the small river, which, during the rainy season, flows under the great arch of the aqueduct; and pursuing its bed for a short distance, I found the *veronica beccabunga*, close to a dirty stream and several tufts of the *solanum pubescens*.

Ascending from the little river by the garden of orange-trees, and turning round to look to the eastward, or towards the city, we are struck with the regularly-stratified appearance of the lower range of the dingy limestone of the opposite side; looking in many places like the coarse masonry of a vast fortress, while the higher range, defaced as it were by the labours of the quarry-men, seems hewn into rude buttresses, and has lost all traces

of those horizontal fissures created by the moisture eagerly attracted from a marine atmosphere—an apparent stratification, which is merely superficial, and only wrought by a long contact with the air. The opposite drawing (Plate 2), which was carefully made on the spot, will convey a better idea of the appearance of these rocks, which evidently supplied the stone for the aqueduct that strides over them [b].

During this short stage of the ascent, the *anthemis hispanica* presented itself, but was confined to a very small space; the *inula odorata* extended a little further; the *convólvulus arvensis* confined itself to the bottom, and although I did not discover a trace of the genus during the remainder of the ascent, yet on arriving at the highest point, in the most exposed situation possible, I found the *convolvulus tricolor*. The *scabiosa succisa* was thinly scattered at the foot of the first hill; the *sisymbrium palustre* also confined itself to the bottom of the hill; the *mentha arvensis* grew at the foot, and frequently presented itself until half way up the ascent, where it totally disappeared. About midway, there were some dwarfish tufts of the *ulex europæus*; and a great profusion of the *genista viscosa*, the *euphorbia dendroides*, and the *atractylis humilis*—the former plentifully, the latter thinly scattered, were found, with the *carduus eriophorus* and the

[b] L'Eveque writes, that the great arch of the aqueduct is 100 feet, three inches, wide between the pillars, and that, from the keystone of the arch to the bottom of the rivulet, its height is nearly 206 feet, and 214 to the parapet. The plan published by Wells in 1792, (from that presented to the Marquis of Pombal,) makes the height of the grand arch 226¾ English feet, and the width 108. I made the height, from the bottom of the rivulet to the parapet, 222 English feet, by a barometer of Fortin's, which marked on the parapet wall 750.66, (thermometer 20¾, thermometer detached, 20¼, centig.) and on the side terrace under the great arch, (5 feet above the bed of the rivulet,) 756.50, (thermometer 20¾, thermometer detached 20¾.) The length of the work at the valley of Alcantara is 2873¼ feet; the whole length of the aqueduct (from its source at Canessas to Lisbon) is 56.380 feet, following sixty-five windings and dingles.

Pl: 2.

S. Bowdich del. T.M. Baynes lithog.

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verbascum thapsum, until I had ascended two-thirds of the way, or about 1400 feet above the sea, where they disappeared: the *thymus vulgaris* continued a little further. The *scilla maritima* (in great beauty), the *daphne gnidium* (very flourishing but dwarfish), the *cardnus acaulis*, the *eryngium tenue*, the *anethum segetum* (which seems to start out of the clefts of every rock, yielding an unpleasant odour), continued from the foot of the ascent to within a few feet of the summit. Two solitary plants of the *dipsacus fullonum* grew about three-fourths of the way up, and just beyond them appeared the *echium vulgare*, thinly scattered.

The limestone only varied in its tints of the exterior surface, which sometimes looked as if it had been covered with a mixture of soot and ochre, and presented longitudinal furrows, resembling woody fibres. I discovered no fetid odour on striking the different masses, nor any trace of fossil remains; but the nodules of silex which it contained, evidently of cotemporaneous origin, were frequent, and deeply impregnated with lime: occasionally portions of common jasper, and, more rarely, of agate, were imbedded. About half way up, I walked over vast sheets of this limestone, more compact, mottled, and seemingly harder than the rest; they were hewing it into mill-stones. The hillocks which bordered the ascent were formed of detached pieces of silex and lime imbedded in a loose earth: there appeared to be a breccia of the same nature, not only above the limestone, but in one instance intersecting it horizontally, in shallow beds. In the lowest rocks, especially in the quarry north of the aqueduct, the mass more frequently appeared crystalline, and once afforded me prismatic crystals, the more compact masses adjoining which were sometimes so happily sprinkled with green dots as to appear dendritic. The highest point immediately west of the aqueduct, and affording a view of the mouth of the river, still presented

this transition limestone, and proved to be 564 feet above its lowest visible bed (no other rock alternating with, or appearing between it), or about 600 feet above the level of the sea[c]. Over the thin layer of vegetable mould which covered the limestone, were scattered large rounded blocks of a dark-coloured, compact basalt, glistening with crystals of horneblende, generally covered with a moss *(hypnum intricatum)* on the part nearest the soil, and with lichens *(patellaria ventosa* and *urceolaria occellata)* on the upper surface[d].

Ascending the hill which appears in the drawing, to the eastern

[c] Barometer 741.50, thermometer 20, thermometer detached 19½ cent.

[d] I found three other lichens, which were not sufficiently advanced for me to determine; and a fourth, which I can only refer to the idiothalames heterogenes of Acharius, having been unable to afford any works on cryptogamia, and my memoranda being too limited to decide on species, or even genera in all cases. I intend, at present, to send home drawings of the new genera and species of the zoology and botany of the parts of Africa I may be enabled to visit; and I hope to persevere in this plan throughout my travel, even should it be extended to some years, by a reasonable support on the part of the government. It takes away very much from the usefulness of a travel, when it is attempted to save the trouble of making drawings, by substituting for that concise description of the object, which will always suffice with an accurate figure, a verbose detail of tiresome minutiæ, wholly uninteresting, and frequently unintelligible, without the aid of the pencil. The only probable difficulty is, that no publisher will undertake the expense of having all these figures engraved, and that they may thus be lost to the naturalist and others, who would feel an interest in referring to them as illustrations of the text. Contemplating this probability, I determined to obviate it in some degree, by regularly transmitting a set of these drawings to Sir H. Davy, to deposit wherever he considers they may be most readily consulted by the naturalists of my own country, who will always find them numbered so as to correspond with the references in the text of my travels. I shall also transmit a duplicate set of these drawings to Baron Cuvier, to be deposited for the same purpose in the library of the French Institute. The two sets of 107 figures (several of which are coloured) referred to in this first part, are forwarded with the manuscript.

Mrs. Bowdich, having reached England before the printing of the manuscript, has withdrawn the above-mentioned figures, and published the greater number of them in the work itself.—Ed.

entrance of the aqueduct, I found above the limestone (but without witnessing the contact), a basalt composed of a dark grey feldspath, full of ochry red and yellow streaks and spots, mixed with shining scales of oxide of iron, and having a granite-like texture and appearance; it seemed to descend in sheets, to the south. The glass disclosed innumerable small grains of green earth, and it passed into decomposing masses so thickly speckled with it, as to assume the appearance of a porphyritic sandstone. Examining the specimens I had separated from the blocks of basalt on the opposite side, with a glass, I found they presented the same spotted structure, with the addition of small crystals of hornblende. The upper part of a decomposing mass of this basalt, dipping towards the south, contained laminæ of talc passing into steatite, and terminated eastward in a deposit of a deep-red ferruginous earth. As I ascended to a wall, close behind the statue at the entrance of the aqueduct, I found several blocks of basalt, similar to those on the western height, and creeping through a large hole in this wall to examine a hillock of the decomposing basalt (the exterior surface of which yielded to the finger, and was profusely speckled with green-earth), I picked up several loose pieces of amygdaloid: the small oval cavities were generally filled with a dull yellowish earth, and the cellular mass was of the same speckled basalt. In one of the small hillocks there was a portion of conglomerate, composed of earthy and crystallized lime, minute scales of talc, and blunt fragments of red feldspath; but the mass was so small, so abruptly discontinued, and so nearly parallel with the basaltic rock by the side of it, that I can say nothing of their relative age. The dip of the limestone seemed to be to the eastward, for its depth diminished in that direction; and it disappeared on that side, at about 400 feet below the height to which it reached on the western side. I had not time to follow it south-

wards, for it grew dark before I had finished the present imperfect, and limited examination of it[e].

Not daring to venture as far as the granite rocks of Cintra, (which are about 1600 feet above the level of the sea), from the hourly expectation of the departure of the vessel to Madeira, I contented myself, the following day, with crossing the river to Almada. As I passed through the fish-market, I looked anxiously for the *peite espada*, a species of *lepidopus*, which has been described several times, and each time as new. The exterior character which struck me most, in addition to those of Cuvier's generic description, was a cartilaginous plate beneath the termination of the mouth, on each side, like an undulating commissure in a bird. I sent it to my lodgings, but it was too far gone for dissection when I returned; I was, therefore, compelled to content myself with a full length drawing, fig. 1[f]. In searching for this fish, I found a species of *gadus*, belonging to the division *merluches* of Cuvier. The Portuguese called it *pescada*[g], and salted it like the stock-fish, g. *merluccius*.

[e] Throughout the neighbourhood of the aqueduct and the ascent to the summits of the neighbouring heights, a profusion of *helices* were scattered; and the same abundance existed on the other side of the Tagus. I found them to belong to three separate divisions of De Ferussac; but with the exception of the *helix aspersa* (*helicogena*, groupe *acavæ*,) and *h. lactea*, I had no means of determining the species: another belonged to the *helicellæ*, (*gr. aplostomæ*) and had a shining, delicate, transparent operculum. Numbers of the *bulimus decollatus* were to be met with at the commencement of the ascent; the upper whorls of the spires were always broken, they were deserted by the animals, and laid just under the surface of the soil, particularly near ant's nests.

It was four feet four inches long, without scales, and of a silvery lead colour. The anal fin had fourteen spiny rays, the dorsal forty-one, and the pectoral eleven rays.

[g] It was of a silvery grey, the lower jaw longer than the upper, the body flattened, and the scales rather large; the first dorsal fin had nine rays, the second thirty-nine, the pectoral thirteen, the ventral seven, and the anal thirty-seven.

Nearly the same vegetation presented itself (the *daphne gnidium* and *euphorbia dendroides* appearing to be the most plentiful), with the addition of some beautiful little tufts of the *anagallis cerulæa*, some large patches of the *antirrhinum majus*, and a yellow variety of the *achillea nobilis*. The formation, however, was totally different to the three which were in view on the northern side of the river, *viz.*, the granite at Cintra, the transition limestone above Ajuda, and the basalt, capping the hills between the aqueduct and the city. It was a range of *calcaire grossier*, or coarse shelly limestone, about 300 feet high, and extending northwards some miles along the river. It was soft but firm, frequently very sandy, sometimes of an orange yellow (especially within), but generally of a greenish and yellowish grey. Pebbles of *silex* were occasionally imbedded, and more frequently in masses resembling clay: it soiled the fingers, effervesced moderately, and seemed deposited in deep, horizontal, beds more compact upwards. The shells were so thickly imbedded, that whole masses appeared to be exclusively composed of them. They were all marine (with the exception of the *bulimus decollatus*), and comprehended three species of *ostrea* (*O. plicatula*, *O. edulis*, and *O. canalis*), the *panopæa faujasii*, the *cyprina islandica*, the *pecten vulgare*, and *p. saxatile*[h], with four species of *terebratula*, three of *turritella*, see fig. 7 and 8, a *cardita*, a *balanus*, a *nassa*, a *murex*, a *conus*, with one valve of a shell of considerable size, and of a bright orange colour, fig. 2, which I do not recognise, and a smaller one of a white colour, fig. 6, which cannot be referred either to tellina, venus, or cytherea, but which resembles all of them[i]. The *fucus*

[h] Rumphius, *Cabinet d'Amboine*, pl. xliv.

[i] The recent shells found among the rocks washed by the river, were the *ostrea plicatula*, *chama albida?* *anomia squamula*, *nassa communis*, *mytilus incurvatus*, *cardium costatum*, a *venus*, *cytherea*, *meleagrina*, several species of *trochus*, a *murex*, *patella*, and immense masses of the *balanus imperforatus*.

vesciculosus covered the rocks washed by the river, intermingled here and there with an *ulva*, which I had not the means of determining.

The next day (the 30th of September) we sailed, and soon after we lost sight of land, encountered one of those south-westerly gales which prevailed at that time, and which placed our ill-found, high-decked, leaky schooner, in no small danger. Although the cabin was closed down for four days, the state of the vessel was such, that neither my baggage nor provisions escaped a soaking. On the fourth evening, the weather calmed a little, and I made regular observations on the temperature of the air and sea, and on the moisture of the atmosphere (both with De Saussure's and Leslie's hygrometers), during the ten days that remained of our passage to Madeira. It would not be worth while to compare so small a number of observations in so limited a track, with those of Baron de Humboldt, Dr. Davy, and others; I shall, therefore, defer doing so, until the remainder of my voyage has furnished me with a greater extent and variety. My fellow-passengers were, a Madeira dandy of the second class, returning from the fashionable grand tour which was to complete his education, and to furnish him with matter for conversation and reflection the remainder of his life; and which is conveniently, economically, and rapidly performed, by paying about £5 for a passage by the Portuguese packet, which returns from Madeira to Lisbon by way of the Azores, so as to have the opportunity of spending a few hours in those classic islands, and the few days in Lisbon which precede the departure of the next packet to Madeira. A Coimbra student, returning to his native island after seven years absence (or as he expressed it, after seven years study), with the title and degree of Doctor of Canon Law, and a splendid diploma, decked with large seals and green ribbons, and preserved in a long tin box, which he opened with prodigious form for our inspection, on his first

appearance from the steerage after the storm, arrayed in a cocked hat and a dressing gown. A countryman of my own, who, having worked his way up, by activity and long service, from before the mast to the rank of master's mate in the navy, had been solaced just after he was thrown out of employ, by a small legacy from an old aunt, and had been persuaded to give up his intention of joining Mr. Birkbeck, for the more profitable scheme of collecting orchil, shooting gulls[k], and rabbits, and cultivating potatoes on the Desertas, the right of which he had purchased for £200 of a Portuguese marchioness, who wanted to raise the wind to make good her engagements as lady patroness, and joint proprietor of a corps of twenty-two French comedians, with whom I had the misfortune to sail in a small brig from Havre to Lisbon, and who would have run the supply of water rather hard during our long passage, had not the ladies (one of whom had sailed in the Nile and seen crocodiles) declared, from the moment of coming on board, that a coffee-cup fairly filled for each, was quite as much as they had been in the habit of using for their daily ablutions. An American gentleman, of polished manners and most obliging disposition, a younger son, as I afterwards learned, of one of the richest merchants of Philadelphia, who, after a three year's tour

[k] These gulls are salted and sold to the poorer Portuguese, who boil them in their soup. The one I examined, appeared to be a variety of the *larus marinus et nævius* of Gmelin, but the head was black (tipped with brown) instead of yellow, and the legs grey instead of reddish; the plumage of its throat was as white as that of the belly, which was however speckled with brownish grey; the under feathers of the tail were also white and tipped with brownish grey; the under feathers of the wings were of the same grey, the upper part of the head of a light grey, the back and neck thickly speckled with greyish brown; the long feathers of the wings were of the same colour, the remiges dark brown; the short upper feathers of the tail white, speckled with greyish brown; the longer feathers greyish brown, irregularly speckled with white: it measured four feet five inches between the tips of the extended wings, and one foot eleven inches in length.

through the British islands and the continent, was returning full of valuable information and sound reflection, enhanced by the most amiable modesty, to relate all he had seen, heard, and thought, to a venerable father, who had cheerfully toiled himself to afford a family of five sons, successively as they had finished their studies, the same liberal indulgence, with equally liberal means, by which my companion had so amply profited. When a prudent man, more or less uneducated himself, not only devotes a part of the savings of a life of labour, but labours still, even in the decline of life, to afford a large family of sons the pleasure and advantage of extensive travel, of which he has been entirely deprived, it marks a greatness of mind, more enviable and more honourable than the highest degree of cultivation. I never felt so reluctant to part with an individual with whom I had so short an acquaintance, as I did to part with this young man, who soon found a vessel in which he might proceed to Teneriffe.

The only fish we caught, were the *coryphena hippuris*, (which the sailors dried and dressed, but found very oily at the extremities, and very dry in the middle) and a bream, which proved excellent eating, and answered to Pennant's description of the *sparus brama* of Linnæus, excepting, that it had only one row of very small, fine teeth, and that it was one foot eight inches in length. Both these fish were caught during a light breeze in latitude 34°, longitude 10° W. The next day, we fell in with two immense logs of American pine, which the captain hove to for, and took aboard. They were completely water-logged, and covered with a continued mass of the *lepas anatifera*; of the several hundreds, which I had thus unexpectedly an opportunity of examining, there was not one with more or less than five valves[1]. These logs were also full of the *teredo navalis*, and a species not described by Cuvier,

[1] Vide Cuvier, *Regnê Animal*, vol. II., p. 506.

but which I found, on referring to my extracts, to be the *teredo gigantea*, so accurately figured in *Home's Comparative Anatomy*: I was surprised to find, however, that the longest did not measure more than four inches[m], which was also the ordinary length of the *t. navalis*; they had all bored in the direction of the grain of the wood. A small crab, fig. 3, *a* and *b*, which I conceive to be a new species of *planes*, was found in great numbers amongst the *anatiferæ*[n]. I kept a small net constantly floating for molluscæ, but neither caught nor saw any; and, although we shot several water-birds long before we made Porto Santo, they all floated past out of reach. The phosphorescence of the sea was evidently produced by a pink *rotifera*, which we fished up in buckets, and which renewed its expiring light whenever the water was agitated, but did not induce any difference of temperature in it, as far as I could judge by an ordinary thermometer. I could not help remarking that our approach to the island, both before and after we saw it, was not accompanied by *algæ* of any description; indeed, there are very few to be met with in Madeira, probably, from the extreme depth of the sea close in to the shore: a small frond of green *ulva* was brought to me, (adhering to a piece of coralline) which I also saw on the rocks, just raising their heads out of the sea, between Funchal and Brazen-head, or Garajao. A species of *sertularia proper* was dragged up, close to these rocks, which seems to form an exception to the general character of the horny stem, it being calcareous; the colour was a dead white, and it was attached to a mass of earth and coralline, by a root like that of a *fucus*; on peeling off the calcareous matter, a stem, also like that

[m] It was a cream coloured, transparent white, with a light brown streak down the middle; the valves calcareous, of an uneven surface, and white.

[n] It was of a delicate, but bright, rose colour: from the symmetrical form of its *test* (notched so regularly as to increase the projection and distinctness of its *chaperon*,) it may be called *p. clypeatus*.

of a *fucus*, was found within, and proved to be hollow. O
branches were several *aviculæ*, covered with long spines, an
one of the ears extremely long: the species not being des
Lamarck, and not recollecting to have seen it, I ha
drawing of that, and a part of the *sertularia*, fig. 5.
attached to these shells, and also to the *sertularia*; an
valve was a fragment of the *siliquaria echinata*. The wh
an elegant, arborescent form, and extremely interesting, fro
combination of objects which it presented.

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CHAPTER II.

Mount Church.—Geology of Western Cliffs.—Lava.—Hut of Idiot.—Waterfall.—Tutinegro.—Corn-Mills.—Ariero.—Camera de lobos.—Sida carpinifolia.—Cliff.—Pao Branco.—Coural das Freiras.—First attempt to go to Pico Ruivo.—Second attempt.—Ferns.—St. Vicente.—House of Donna Anna.—Poul da Serra.—Pico da Cruz.—Second Excursion to the Westward.—Malmsey Plantation.—Cavern.—Brazen Head.—Excursions to the Eastward.—St. Cruz Machico.—The Lagoa.—Concluding remarks.

NONE of the several vessels, we found at anchor in the bay of Funchal, being bound for Sierra Leone, and none being immediately expected, I prepared to make some excursions into the interior of the island. To those who have visited the tropics, nothing can be more gratifying, than to find the trees they have there dwelt on with so much pleasure, and which are decidedly the most beautiful of that part of the creation,—to be reminded of the vast solitudes, where vegetable nature seems to reign uncontrolled and untouched,—to see the bright blue sky through the delicate pinnated leaves of the mimosa, whilst the wood strawberry at its feet, recalls the still dearer recollection of home,—to gather the fallen guavas with one hand, and the blackberry with the other,—to be able to choose between the apples and cherries of Europe,

(which are so much regretted) and the banana;—it is this feeli[ng] which makes Madeira so delightful, independent of its bea[uty] scenery, and the constancy and softness of its temperature.

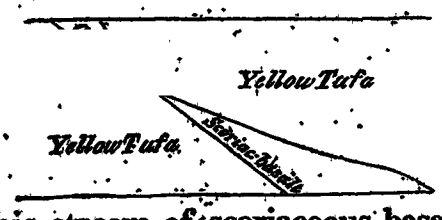
The country at the back, and sides of Funchal, pre[sents] broken outline of a segment of a vast natural amph[itheatre] basaltic peaks and mountains,—rising to 3800° feet [above] Mount Church, which is the most striking edifice in this b[old] landscape, and is elevated 1906[P] feet above the sea, presenting [the] most picturesque breaks and vistas,—intersected by ravines and torrents,—and covered with undulating and rugged ridges, and sheets of basalt, diverging from the more central heights, and descending boldly to the sea, like the gigantic buttresses of some vast interior mountain, and indicating so distinctly the courses of the igneous streams which enveloped the island, that they seem as if they had been arrested and indurated as they flowed, as an evidence for future ages. The prodigious space of time this originally undulating and furrowed surface has been worn by heavy rains and torrents, explains the increased depths of the ravines and ridges. I hastened to the western beach, to interrogate the natural section, which the attacks of the sea have wrought, by gradually wearing away, and undermining the inclined plane, in which the streams of basalt had descended to the water's edge. I descended the ravine to the westward, and turning towards the town from the beach, I found myself beside the cliffs of tufa and basalt, which had struck me so forcibly as I walked from the Loo

° Oct. 31, B. 670.25, T. 15½ C. T.d. 60 F. 15½ C. 1 P.M., Sauss. Hyg. 98: corresponding observations at the turret of Mr. Veitch's house in Funchal (154 feet above the level of the sea), 764.35. T. 22½. T.d. 70¾ F., 21½ C. Sauss. Hyg. 66,—giving 3812 feet.

P 717.10, T. 24½ C. T.d. 69½ F. 20.8°C. Sauss. Hyg. 62. 2½ P.M., at turret 764. 28, T. 22½ C. T.d. 70¾ F. 21½ C. Sauss. Hyg. 65. Leslie's Hyg. 4,—giving 1916 feet.

landing place, on my first arrival. This line of cliff, which extends to the bay, or break, in which the town is situated, a distance of about three-quarters of a mile, varies in height from fifty to one hundred feet; and its natural sections disclose additional features, as you approach the isthmus of rock which forms the Pontinha. At its western termination, or close to the ravine, we find the following section, raising our eyes from the base:—a yellowish tufa, almost hidden by the large masses of basalt and tufa which have fallen from above, seven feet of scoriæ, or cinder, ten feet of yellow tufa, seven feet of scoriæ, with narrow horizontal ribands, or veins of tufa, six feet of red tufa, fifteen feet of compact columnar basalt: all these beds are more or less horizontal, only varying from that position by slips. As we walk to the eastward, the section deepens gradually to about 100 feet, and the yellow tufa at the base, becoming more exposed, discloses two horizontal bands (varying from 2 to 3½ feet) of angular, and more or less rounded, fragments of pumice, the largest not exceeding the size of a walnut, and inserted as thickly as possible in yellow tufa. A close view would not have conveyed an idea of the appearance of this section so clearly, as that which is adjoined to the present description, plate 3 A, which was taken from the Pontinha, somewhat less than half a mile distant, and is a faithful representation, not only of the depth and outline, but of the colours of the beds or strata. I found a poor family living in a spacious apartment, which they had hollowed out of the yellow tufa, and which made a much more comfortable dwelling than their ordinary habitations: the peasantry frequently make cellars and out-houses in the scoriæ. Immediately after, or at about 600 yards from the Pontinha, the upper columnar basalt is abruptly discontinued, not from having been removed, but from this point being the eastern limit of the stream out of which this face, or section, has been created, and from no other stream of this upper basalt having directed itself

toward the sea between this point of the cliff, and that o[illegible] the Pontinha, on the east. Of this we may easily satisfy [illegible] by examining the direction of the basalt ridges wh[illegible] course of the streams, and the surface of the cou[illegible] level with the cliff inland. For some distance, the [illegible] nothing but the beds of tufa, scoriæ, and pumice, in sho[illegible]y the same as the section drawn, taking away the beds of [illegible]mnar basalt; but a slip on the eastward terminates in the appearance of scoriaceous basalt, beneath the yellow tufa, which has hitherto formed the lowest bed of our section, and that, as if it were a prolongation of the band of scoriæ, and had forced its way through the yellow tufa, thus,



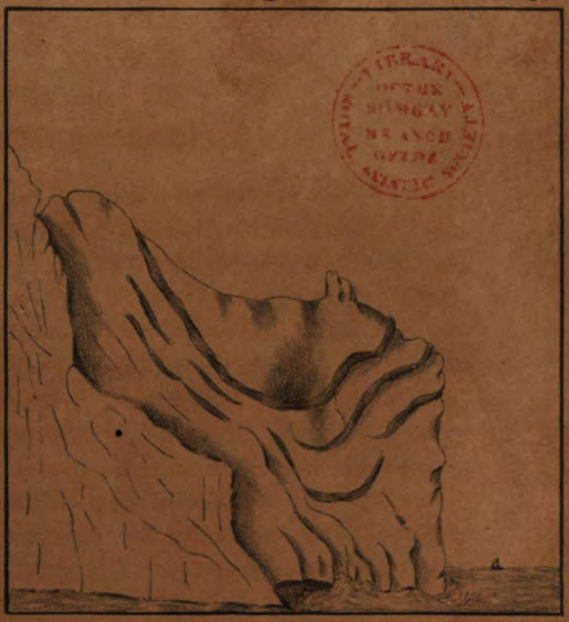
The breadth of this stream of scoriaceous basalt, is about seventy yards; the depth of the upper, or vaulted part, as seen in the drawing, Plate 3, B, is about twenty feet, that of the lower part, (which is composed of sheets and ridges running into the sea, and dipping to the south, in an angle of 20°) is seldom more than four feet. Beneath this scoriaceous basalt is red, passing into yellow tufa, with a band of pumice, at the lowest visible part of the bed, which is about ten feet deep when it is lost sight of: this lowest tufa, scarcely discoverable in the cavernous part of the scoriaceous basalt, is best seen in the break close to the left of the hut, in the drawing.

The cells, of which this lower, or scoriaceous basalt is full, are generally long and narrow; in a perpendicular section they appear confused, but when the basalt has been cleft in an inclined plane, parallel with its dip, it becomes evident, that these cells, (always

A.

D

Pl: 3.



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empty) are in the same direction as the stream. So abundantly have the gases escaped in the parts near the surface, that the cavities are considerable, probably from the cells left by the gases having been so close and frequent as to communicate with each other, and from their slight and imperfect partitions being subsequently obliterated by decomposition. The sides of these ridges present larger cells; continued projecting ledges, twists, and folds; and look in every respect like igneous streams, suddenly petrified. In the cavernous part (represented in the drawing) this scoriaceous basalt, particularly open to the attack of destructive elements, from its numerous cells, is in such an advanced state of decomposition, that it looks like a dark brown indurated mud, in which more obdurate masses are here and there imbedded. But the shallower vaulted cavities, which we remark in the lower part of these ridges, are probably owing to the heated stream of basalt having passed over some patches of water left by the retiring tide, just before it reached the sea, which, being immediately converted into vapour, raised these vaults above the parts where they were developed and liberated. This scoriaceous basalt, where it is not in an advanced state of decomposition, is full as hard as the compact, but of a less specific gravity[q].

Bearing in mind, that the streams of scoriaceous basalt presenting these characters, have flowed directly into the sea, which still washes over them, and that the columnar basalt crowns the tops of the cliffs only, (which are from fifty to one hundred feet above the level of the sea) it is evident, that sudden congelation, instead of producing such an arrangement of particles, as M. Faujas supposed, entirely prevents it[r]. We shall presently find too, that the

[q] Compact basalt, 2.9. Scoriaceous basalt, 2.6: by Guyton's glass Areometer, and in distilled water. Red tufa, 1.75. Yellow tufa, 1.94.

[r] In the natural section close to the Pontinha on the east, the columns are more symmetrical than to the west; and the basalt, where it has been broken away by the workmen, presenting transverse cracks, and a hackly appearance. Plate 3, C.

most symmetrical prisms are exposed on the faces of the mountains, and form the most elevated range at the sides of the inland valleys, where they could never have been in contact with the torrents which flow beneath, and which could not have existed when the streams of basalt were first ejected from the crater. The opinion, that the columnar structure natural to the basalt has been developed by the continued action of streams of water, which formerly washed, but now flow beneath it, from having in the course of ages hollowed out a much deeper bed than that which it occupied in the first instance; this opinion struck me as very probable, until I remarked the position of the columnar basalt just alluded to, and represented in the coloured sketches, Plate 3, A, C, and of that exposed high up on the sides of mountains, remote from valleys, where it must have always been, like the columnar basalt crowning the cliffs at the sea-side, out of the reach of the action of water, unless we take into account the heavy rains, and the torrents poured out from the crater during eruptions, causes, seemingly too transient, to be adequate to the effect, which could only be ascribed to a long and continued action on the part of the waters. Could the above opinion have been established, we might have estimated, by comparing the actual depth of these ravines, or valleys, with the observed increase of that depth, in a known period of time, the probable age of the basalt. The valleys or ravines of Madeira have, of course, been deepened by the agency of water, but I cannot consider that they have been entirely formed by it: the various and partial directions of the streams of basalt, as they descended from the crater to the sea, and the pre-existing hills and valleys (for we shall presently discover that the base of the island is of a transition, if not of a primitive formation), being no doubt the primary causes.

The columnar basalt is, generally speaking, compact, of a broad conchoidal fracture, splitting in horizontal laminæ, or at right angles to the prism, dark grey within, or on the surface of a fresh

A. Pl. IV.

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S. Bowdich delet. lithog.

B

fracture, which becomes covered with a superficial, decomposing coat of brownish red, with age, inducing brittleness, and passing ultimately into yellowish white, and dull brown; a moderately thin plate of the columnar basalt, when covered exteriorly with red powder, will snap between the fingers. There are narrow beds both above and below these columns, and frequently between them, of shapeless fragments of basalt, very frangible, of an earthy fracture, generally about the size of a walnut, imbedded in, or thickly coated with a friable earth, resembling the tufa. In the columnar basalt immediately above the beach, this conglomerate is not above eight inches deep, the imbedding earth resembles the yellow tufa, and the fragments are not porous, which they are, minutely, throughout the inland section, about a quarter of a mile behind it, on the right as you descend to the second ravine west of the town. Descending this ravine to the beach, we have columns of porous basalt on the right, with beds of conglomerate above and below it, the latter about four feet, and the former about six in its greatest depth: the fragments imbedded are here much larger, in some instances have lost their colouring matter entirely, and disclose the *fer oxydulé* (which is not distinguishable in the basalt before decomposition) in black specks. I no where observed this loose conglomerate in longitudinal lines, or patches between the columns, (which were always vertical) but only in beds above and below them, and that, not only in the direction of the dip, but in that of the drift line; wherefore I concluded, that it could not be the result of a partial decomposition of the basalt, and this was afterwards confirmed, by finding large masses of lava, as perfect as that from the crater of Teneriffe[*], imbedded con-

[*] I have no memoranda either of Haüy's or Faujas' classification of lavas, but this is of a reddish brown, and might well be called vermiform, for it looks like a surface covered with a mass of leeches, erecting their bodies as if in the act of regorging. I compared it with a specimen just brought from Teneriffe, by a Russian gentleman, Mr. J. Thal.

fusedly in this conglomerate, beneath, and between the porous basalt at Praia Formosa. To the eastward of Funchal, this conglomerate matter increases in proportion, and is insinuated between the more compact masses of basalt in vast patches, as if it had flowed down, and been deposited at the same time with it. The olivine of the compact basalt near the coast, and in the immediate environs of Funchal, is generally granular; it was not evident in any state in the scoriaceous basalt. I observed several pieces of basalt in the walls about Madeira, containing mammillated carbonate of lime; the mammillæ about the size of small shot, generally separate, and always in a cell, sometimes large enough to contain several; so that they would appear to be infiltrations; but I very rarely found it in the compact basalt near the sea, and presume, these stones were broken from the fragments washed down by the torrents from the interior. The *fer oxydulé* principally characterizes the red tufa (which indurates by exposure to the air, and forms a building stone), though it sometimes affords long flat prisms of common horneblende, and acts more powerfully on the needle than the yellow, which sometimes contains small glistening particles of feldspath: both give out innumerable bubbles of air when put into water; but I shall have occasion to describe them more particularly, when speaking of the best soils for the vines of Madeira, and will only mention here, that when the red tufa is in immediate contact with the porous basalt above it, (as in the ravine descending to the beach) it is formed into small pentagonal prisms, about 2 inches in length, and $1\frac{3}{4}$ in diameter; in this case it is of a reddish brown, looks like a baked clay, and its specific gravity is increased to 2.06. Some of the pumice fragments (evidently not ejected until the scoriaceous basalt had flowed and deposited itself), imbedded in the yellow tufa of the ravine by which I descended to the beach, contained minute crystals of horneblende; its colour was yellowish, its structure more frequently porous than cellular, rarely fibrous, (therefore

probably, not formed at a very considerable depth beneath the surface of the globe), and it was always supernatant[t]. If I am not mistaken, pumice has not hitherto been found with basalt; when I picked up a detached morsel on my landing, it led me to expect a trachytic formation: I do not think there is a trace of obsidian in the island. The scoriæ, especially in the inland sections, are frequently coated with a shining matter, generally pale brown, but sometimes black, and of a bituminous appearance; it did not detonate however with nitre, nor did it lose its colour or lustre at a red heat. A grey crustaceous lichen *(idiothalames Ach.)* covers the porous and compact basalt, (in patches, ring within ring) and is generally accompanied by another, equally crustaceous, but more delicate in form, and of a deep orange. A third forms large light coloured patches on the inland basaltic rocks, and is so abundant, that in several instances it gives a different hue to that part of the landscape[u]. All the lichens of Madeira are extremely interesting, from their abundance or beauty; but, for the before-mentioned reason, I have only been able to refer some of them to the great divisions of Acharius. The *anethum* starts out from the rocks in the same way as at Lisbon, and is found in great quantities on the sea-shore; the *ferula glauca* is abundant. The only species of cactus which can decidedly be pronounced indigenous, is the *c. opuntia*, which only grows on the rocks nearest the sea[w].

[t] M. Guillin, after a mere glance at Funchal and its bay, has not hesitated to assert, "que la lave qu'on trouve à Madere n'a aucune partie vitrifiée, ni aucune *veritable pierre* ponce." See the Appendix of the *Voyage de Bory St. Vincent.*

[u] Genus, *thallus crustaceus, pallidus. Scutellæ albæ, in thallo centrales.*

[w] The recent shells which I found scattered over the black ferruginous sand, and amongst the basaltic pebbles of the beach, were a *murex*, a *tritonia?* (brown, with darker stripes, and yellow lips); *murex*, (white); a *purpura*, (dusky brown); a *columbella*, (white); a broken specimen of the *argonauta tuberculosa*, and an *avicula*, light brown, mottled with black towards the beaks. The *patella plicata* abounds on the

The little cabin, which contrasts its cheerful colour to the gloomy tint and blistered aspect of the basaltic caverns, on whose margin it seems to totter, and the crumbling scoriæ of whose vaults, appear to hang together so loosely, as to be ready to sink beneath its weight, and to bury it in cinders; this little hut, erected as it were on the ruins of a former world, rocked by every wind, and dashed by every southern surge, is inhabited by a poor maniac, who, being robbed, by a brother, of all the savings of a life of labour, at the very moment the old age they were to solace began to creep upon him, lost his reason, not, as might have been expected, to revile that providence, which for some wise reason we might have excused one of his class from crediting, had failed to protect him, but peaceably, and without harming the most insignificant object about him, to raise rude altars to his God, and to deck his garden-wall with crowns of thorns, in honour of his Redeemer, and rudely cut stones (for they could scarcely be called figures), in memory of his Apostles. A vacant smile played for a moment on his sad face, as I stopped to examine, and as he thought, to admire these highly-prized ornaments of his dwelling, which seemed to be richer in this respect, in his eye, than the most splendid cathedral; and the look of distress and emotion, which followed the unwonted smile my respectful forbearance had induced, when a troop of idle boys discharged a volley of stones from the beach, and destroyed the greater number of the rude images he had raised with so much labour and so devoutly revered; the look he gave me at this moment of wanton cruelty, went to my heart. This was not the mania which too often follows a blind and gross superstition, it was the pure, natural, and volun-

rocks, with several others of the genus; one was of a dull light green, with blackish brown stripes, and another of a dull grey spotted with brown, with the apex lighter. The branchiæ of the animals of these *patellæ* were not interrupted, and all are eaten.

tary feeling of the heart, undirected, but not unabated, from the loss of reason.

I lost no time in beginning my excursions into the interior, and first visited the waterfall, which is about three hours walk from Funchal. The most direct route, is to descend into the ravine of the first torrent to the westward of the town, and to follow it until it is terminated by the fall. The bed of the torrent over which you walk, for there is no path, is full of immense, rolled, masses of basalt, nodules, and amygdaloidal fragments of all forms and sizes; leaving gaps of surface between, occasionally strewed with ferruginous sand, from the decomposition of the masses of tufa which have been swept down by the torrent. The whole distance is to be performed by stepping and jumping from block to block, (which, when they become slippery after rain, is not a little hazardous) and descending at rare intervals, to walk over sharp stones and sliding pebbles. To quit the torrent, and scramble over the hills and basaltic rocks which bound it on each side, is to lose yourself and the objects of the journey, as I found in my first attempt to reach it. Don Joze Monteiro kindly volunteered to accompany me the second time, and proceeding westward from the Mount Church, we descended with some difficulty into the torrent, at about half way between the waterfall and the mouth[x]. The lower part of our descent was variegated with *pelargonia*, the *digitalis purpurea*, and various *compositæ*, *umbelliferæ*, and *ferns*; the two latter extending to the bed of the torrent, where they were mingled with *hepaticæ* and water-cresses. The *adiantum Africanum* grows abundantly, and lines every little cave hollowed out of the rocks by the streams, but the inhabitants make no use of it; probably, this species, although so similar to the *a. capillus veneris*,

[x] We passed over several patches of red earth, apparently resulting from the decomposition of the tufa and basalt, but it seemed to me, to be highly unfavourable to vegetation.

may not answer the same purpose[y]. Here the fragments of basalt left by the torrent, which could sweep them no further, were of an enormous size. The rocks on each side are of basalt, frequently columnar, covered with a decomposing red earth, and from three to 500 feet high. The numerous horizontal projections of these rocks contained small natural basins, or reservoirs of water, looking like the baths of the wood nymphs, and there were traces of waterfalls in all directions. The large *vinhaticos*, with their dark shining leaves, were frequent near the bed of the torrent, and presented immense trunks in a state of decay; whilst the *til* grew out of the rocks on each side, its tint varying with age, from a lively, to a deep green, and mingled with long grass. The ravine winds beautifully, and every turn seemed to promise us a sight of the fall, reconciling us to the successive disappointments, by some additional charm or variety in the scenery: we heard the noise of the water about half a mile off. A beautiful feathery lichen waved on the fragments of basalt, which had acquired a silky polish from the water occasionally flowing over them; and an abundance of the *mentha gratissima* delighted the eye with its pretty flower, and shed its rich fragrance most profusely. The entire depth of the fall seemed to be about 300 feet, but there is a break after the first 100 feet; the sheets of water are received in a deep natural reservoir, (2° cooler than the temperature of the shade, which was 54°,) and scattered a shower of glistening particles during their fall, gradually dispersing in a silvery mist, which seemed to shed a perpetual spring over the vegetation around. We sat to contemplate its beauty on gigantic masses of basalt, which attested the ravages of the torrent, and struck us with awe, as we raised our eyes to the heights from which they had fallen. Few winters pass without some of the unfortunate peasants being crushed or precipitated, as they fearlessly and gaily carry their burdens of fire-wood along

[y] The making of capillaire.

the narrow, rugged margins of these awful precipices. All prospect was shut out by the steep rocks, which the last winding of the ravine placed at our backs; every passage appeared blocked up; there was no distance but in height, and it seemed as if no extraneous thought were to be admitted, whilst we contemplated the majesty of nature. There is a lower stratum of the red tufa nearly horizontal, covered by a considerable depth of basalt; above is a second stratum of the red tufa, dipping rapidly to the south. This ravine is inhabited by that beautiful species of owl, the *strix flammea*. The *tutinegro*, so much admired for the melody of its note, is a species of nightingale, *(curruca, Bechst.)*[z] one third less than that of Europe. I saw another and more curious bird, fig. 28, but I doubt if it is a native of the island. The outline of the beak most resembles that of the widow-bird, *(vidua, Cuv.)* but the commissure is situated like that of the grakle, *(gracula, Cuv.)* immediately beneath the nostril, and forms a much deeper angle; it evidently belongs to the *conirostres* of Cuvier, and I should place it under the name of *goniaphea*, between *fringilla* and *corythus*[a]. I could not but remark the simplicity of the corn-mills which are pretty frequent on the margin of this torrent, every man being now allowed to grind his own corn, or his neighbour's, whereas, before the constitution, it was a monoply inherited by a single noble family, whose agents charged three times the present price. The two stones are hewn out of the columnar basalt, and from the vast fall and body of water (conducted through a wooden shute) which they can afford, they use but one single cross bar or wheel,

[z] See Bowdich's *Introduction to the Ornithology of Cuvier*, p. 40. It is of an olive colour, with a black patch on its head, feeds on guavas, figs, and worms, rests in trees, and sings by day. I should name it, *c. melanocephala*.

[a] The upper mandible closes over the lower, and the middle toe is longer than the others; the whole bird is black, with the exception of the head, which is azure. *G. leucocephala*.

and even place this horizontally, the force being sufficient to keep up its rotatory motion in this unfavourable position.

My next excursion was to the peak of Ariero, on the eastern side of the Coural, and about three hours ride from Funchal. Approaching the Mount Church, we find beautiful chesnut woods, clothing the sides of the precipices; and in the rugged path which commences above this building, I was astonished to find the elegant *fuchsia coccinea*, and the blushing *rosa Benghalensis*, both of which had evidently strayed from the neighbouring gardens. I have not been able satisfactorily to separate the naturalized and indigenous *solaneæ*; the *s. cerasiforme* grew higher than the others, but it had probably strayed from the gardens above this church. The sides of the hills presented the most beautiful contrast of tints, from the large patches of *erica*, broom, and evergreen shrubs; the *digitalis purpurea*, appeared by every stream or spring. The myrtles are very beautiful, and grow luxuriantly; they extend to a height of 3000 feet, but they certainly do not amount to forests, or even thickets, nor do any reach the region of the Vaccinia[b]: they were formerly much more numerous, having been injudiciously cut for the ornamenting of churches and processions on religious festivals. The latter part of the ascent is along the barren rocks of basalt and red tufa, which form the highest outline of the view behind from Funchal, and are 3700 feet above the sea. One sudden turn, through a romantic pass, opens a fine valley with thickets of laurels, dwarfish to be sure, but in such profusion as to clothe the whole landscape; whilst violets are growing at their roots. The plain near the peak was covered with the *vaccinium*; its leaves turning red, but partially concealed the black berries; and the *usnea* lichen waved from one tree to the other, like masses of long green hair. The pasturage looked rich, not merely from the fresh

[b] The lamented Professor Smith must have made both these assertions inadvertently. *Introduction to the Narrative of the Expedition to the Zaire*, p. lxviii.

green of the grass, so constantly moistened by the vicinity of the clouds, but from the young shoots of *erica*; and where the masses of tufa, and superincumbent soil had fallen from the heights, the roots of the laurels and arborescent heaths were left bare, twisted like serpents. I passed a small natural excavation, which disclosed several strata of tufa and scoriæ, which seemed to be the beacon of my guide, who remained there; and in a few minutes after, I reached the summit of the peak of Ariero, amidst a thick mist, like small rain, which entirely deprived me of the view I had promised myself. The temperature, in consequence of a strong north wind, was lowered to 43°, being 28° less than I had experienced three hours before, in the shade at Funchal; the peak is 5446 feet above the sea[c]. The *juncus glaucus* abounds on the highest parts of this eastern side of the island; the constant moisture of the air, perhaps, accounts for its luxurious growth, so far removed from any stream.

I started the next day for the Coural das Freiras, apprehensive, that the wished-for arrival of a vessel for Sierra Leone, might not leave me the time to do so. The road from Funchal to Camera de Lobos, (where you quit the sea, and ascend to the interior of the island) is unusually bare of vegetation. The crustaceous lichens form the principal feature, with here and there an *euphorbia*, a *cheiranthus*, scattered patches of the *sida carpinifolia*[d], and a few fig-

[c] Although southerly winds are announced by the fall, and northerly, by the rising of the barometer, when in the lower regions of the atmosphere, yet the inverse seems to happen in the upper. M. Ramond, when measuring elevated peaks, has observed gusts of wind from the north, lower the mercury by raising the column of air, whilst those from the south produced the contrary effect for the moment. These oscillations extended from two to three tenths of a millimetre, even when the winds were by no means strong.—*Memoires sur la Formule Barometrique de la Mecanique Celeste*, p. 53.

[d] I have been told, that the poorer inhabitants drink the infusion of its leaves as tea, but the known properties of the *sida* are so contrary to those of all other plants used as tea, that I am inclined to give very little credit to it. The principal plants sub-

trees starting from the clefts of the rocks, dwarfish and distorted: they afford good, but small fruit, and seem, on the lower parts of the island, to take the place of the laurels, which confine themselves to the higher regions, unless cultivated. The road nearer the sea, however, affords occasionally, in addition, the perfume of the *mimosa cornuta*, (the seeds of which I suppose have been introduced from the coast of Africa) delightful at a short distance, but too powerful when near. The grass, *briza media*, vulgarly called maiden-hair in England, abounds all over the western side of the island; nor must I omit to mention the *cestrum vespertinum*, (*bella noite* of the Portuguese) the flowers of which (although it is said to exhale a noxious odour from its leaves) smell deliciously in the evening. After passing the valley and torrent, where the *arundo sagittata* is thickly planted, the approach and descent to Camera de Lobos afforded some splendid *cacti*, rising to the height of small trees, and with trunks or stems nearly as thick as my body: they were the loftiest that I had ever seen of that species, with the exception of those in the Botanic Garden at Lisbon. I should mention, however, that there is a large mass of basalt in the bed of this torrent, which is full of small cavities, lined with acicular crystals of mesotype, interrupted here and there by bi-pyramidal, and prismatic crystals of carbonate of lime, frequently an inch long. I did

stituted for the *thea* are, the *symplocos alstonia*, which was supposed by Baron de Humboldt to have been infinitely beneficial to himself and M. Bonpland, from the favourable action of its astringent and stimulating qualities on the gastric system, and as a sudorific; they found it a powerful preservative against their frequent exposure to rain on the Cordillieres: (*Plantes équinoxiales*, t. I., p. 185:)—the *camellia japonica*, which belongs to the *theaceæ*, and is much used even in China, and also possessing astringent and stimulating qualities: the *rhamnus teezans*, the *cussonia paragua*, and the *ceanothus Americanus*, which are all bitter, styptic, and act upon the nerves; whereas the *sida*, which belongs to the *malvaceæ*, is emollient and calming, (*Decandolle. Essai sur les Prop. Medicales des Plants.*) and did it act like the *thea*, would be the first-known exception, to a family which has a remarkable unity of properties.

not find any rock similar to this in the neighbourhood, and I never met with mesotype but in this fragment. Probably, like leucite, it may only be found in the lower deposits, or those more ancient streams which have flowed immediately from the mouth of the crater. I here found two solitary plants of the weld (*reseda luteola*), neither used by, nor known to the natives. Turning round to descend into the village of Camera de Lobos (where I remarked thin flakes of carbonate of lime in the yellow tufa), we are struck with the gigantic cliff which towers above it, the whole depth of which, (1600 feet) is one vertical sheet of alternating, shallow strata of basalt, tufa, and scoriæ, ribbed from top to bottom with narrow dikes of basalt; but I shall return to this cliff again, in sailing along the shore to the Fazenda dos Padres, and I will only observe, that it would be an excellent spot for experiments on the downward velocity of sound. The opposite sketch, Plate 4, A, was made near the top of the eastern hills, where the appearance of the church steeple makes the towering grandeur of the cliff the more striking.

By following the most western of the two roads to the Coural, by Mr. Veitch's Quinta (for there is another still more direct, which does not pass that way), I should not have gone through Camera de Lobos, which I determined to do, in order to ascend and measure the Pao branco, the highest point on which I had observed the vine to be cultivated in this direction. I found it to be 1922 feet above the sea, and about 158 feet lower than the bottom of the Coural das Freiras. In ascending the road to the Pao branco, I found fragments of compact basalt with common pyrites, (*fer sulfuré*, H.) which is also found in the conglomerated fragments beneath the basalt at Campanario, mixed with olivine, presenting the pseudo-metallic colours which mark its decomposing state. There is a chalybeate spring at Campanario, and also at Machico, where the specimens are much more beautiful. The

bronze yellow colour led me at first to expect it might be magnetic pyrites, *(fer sulfurè ferrifère,* H.). but its slight effect on the needle, and its chrystallized form, corrected the impression. Pyrites have been cited in basalt, and there has been no doubt of the fact, but I believe specimens have not yet reached any cabinet. I descended again for a short distance, and turning to the north, pursued my course to the Coural along the edges of the beautiful ravines, which appear on the left, in going by the more direct road. A slight, crazy railing occasionally edged the precipices, along which the narrow path ascends; but more frequently, there was not even this fancied security to assure the passenger, while he contemplated the awful depths beneath.

A conglomerate of fragments of porous and decomposing basalt, above the upper or compact basalt, of inconsiderable depth, and not general, was the only additional deposit to what I had observed at the water-side. Basaltic dikes, intersecting the tufa, frequently disclosed themselves in the sides of the ravines, which were highly cultivated with the *convolvulus batata,* and an *arum,* which I shall describe presently. The streams which usurp the bed of the torrent until the rainy season, flowed through thick tufts of water-cresses; the honeysuckles twisted round, and hung from one chesnut tree to another; the brambles were bending under the weight of their berries, and the wild strawberry was pushing forth its compact foliage from the banks, which were lined with the most elegant ferns, whilst the sides of almost all the precipices were covered with vines. Here I found a plant much resembling the *physalis alkakengi,* but which I think must be admitted as a new genus; as the capsule, seeds, and corolla all differ: the *p. alkakengi* is too bitter to be eaten, but the Madeira genus makes tarts of an agreeable, gooseberry-like flavor[c]. This is, I believe, the richest vine

[c] The *Herschelia,* which I have ventured to erect into a genus, has, I believe, been figured by Curtis, as the *physalis edulis:* it bears very closely upon both *atropa* and

district, and the wine of Torre (which is close to the road on the eastward) is perhaps the most esteemed of any in the island. The upper basalt, on the side of the bed of the small torrent, behind Mr. Veitch's Quinta, (2700 feet above the sea,) was in an advanced state of decomposition; sometimes indeed being so soft as to be sectile, which, as I can only attribute it to a continued action of water, seems to me to indicate that the stream, which now flows many feet beneath it, has gradually deepened its bed, leaving the sides which it formerly washed, in the state we now find them. The softer parts somewhat resemble the decomposing basalt above the transition limestone at Lisbon; in the harder, the feldspath ground has acquired a light grey colour, and the long flat crystals of common hornblende imbedded in it, are sometimes glistening, but more frequently in a dull mouldering state: the latter makes a very good building stone. A little *hepatica (sedgwickia hemispherica*, fig. 25), which I believe to be quite new, grows on the borders of the smaller streams[f]; and in the torrent, I found the *marchantia stellata*, which, from the abundance of its brown

physalis: from the first it differs, because its corolla is wheel-shaped and not campanulate; the antheræ are oblong; the stigma is not furrowed; the calyx is bladder-like, and angular, and always of a pale, but bright green; the stem hairy, and the leaves alternate: to the *physalis* it presents the following contradictions, *the shape of the seeds*, the position of the leaves, the flowers being *always* solitary, and the *thick hairiness of the inner part of the corolla*, and of the whole plant:

Genus. *Herschelia*. Cal. 5-fidus. cor: calyce ultra duplum longior, rotata, quinquangulata, lutea, in centro purpurea, *intus villosa*. Stam. 5, filamenta filiformia, antheræ oblongæ. Stig. capitatam. Bacca globosa, carnosa, calyce ampliato, vesicario, angulato, tecta. Semina plurima, *compressa*, *rotunda*. Caulis suffrutescens, subangulatus, villosus. Folia alterna, subcordiformia, acuminata, subintegra, villosa. Flores solitarii, Sp. 1. *H. edulis*.

[f] Genus. *Sedgwickia*. Frons aphylla, lobata, glandulis aquosis sparsa. Capsula in fronde sessilis, centralis hemispherica. Seminula, nuda, compressa, membranacea, in hemispherica capsulæ. Frondes virides, pulcherrimæ, fibris capillaribus ad terram adhærentes. Sp. 1. *S. hemispherica*.

silky fibres, forming large masses around the roots, may probably be the plant *feto brun* (brown fern), reported by Vandelli to Murphy, and mistaken for a fern. I could not even hear of this fern, which, he says, is only found in Madeira, and produces fibres of so fine a texture on the back of its fronds, that they may be woven into a beautiful material for clothing. Here I had an opportunity of remarking, that it is the Norway rat, *(mus decumanus,)* which inhabits the interior of the island, although it only arrived in Europe in the eighteenth century[g]; and, that the bat is more than specifically distinct from all those which have, as yet, been described, for it has four pointed incisors above (two by the side of each canine, with a large interval between), and six small incisors below, with three indentations in each. It forms a new sub-genus between *pharopus* and *cephalotes*, and may be named, *nyctalus verrucosus*[h].

As I approached the heights which conduct to the brink of the Coural, the chesnut-trees formed entire woods, and presented the richest autumnal tints; the *salix rubra*, and a great variety of plants margined the streams, over which waved a beautiful fern, frequently six feet in length; the *asperula aparine* attached itself to my clothes as I walked along, the violets abounded on the banks, and the splendid *bella donna* lily[i] presented itself in various

[g] Cuvier, *Règne Animal*, t. I. p. 197.

[h] Νυκταλός, noctem amans. *Suid: de Diogen. Cyn.* The lower canines have a heel. The muzzle and *oreillettes* are simple; the ears are equal to the depth of the head in length, and present clusters of orange warts on the outer part, and a few within. It has a nail, and extra joint to the forefinger; three joints to the middle finger, two to the others. The interfemoral membrane (not notched, but triangular) reaches to within one line of the end of the tail, which is within it:—width, from the tip of one wing to the other, 11¾ in., from the muzzle to the tip of the tail 4¼ in., colour, dusky brown.

[i] *Lilium Madeirense.* Calyce campanulato, laciniis subrectis basi subconniventibus, sulco longitudinali, nectarifero nudo. Staminibus 6, filamentibus æqualibus,

directions, raising its bright pink blossoms, which formed a beautiful contrast to its dark-coloured stem; this last plant especially contributed to give the landscape the appearance of a ruined garden. I gathered several *fungi* amongst the thick turf; one of them was the common mushroom, but I did not hear of its being eaten, and my guides expressed great alarm at my touching any of them. The *agaricus* found amongst the chesnut-trees, grows to an enormous size; and another in the same locality answered to the description of the *a. aurantius*, or the *jaseron* of the French. The most remarkable, was one with a pale yellowish bark, wrinkled, and full of small warts; it had no stem above ground, nor did it appear to have a volva: when divided, the inner part was greasy and firm, and of a deep black; the peasantry believe it to be a dreadful poison, even to the touch[k]. The *clavaria* grows to a large size, and is very abundant; it does not confine itself to laurels alone, but appears also on the chesnuts, or perhaps, any large tree.

Having reached almost the highest part of the road within view, and being 3700 feet above the sea, you turn to the right, and walking over a gentle ascent of thick turf, covered with broom bushes, (on which the waving bags of a small spider are thickly suspended), the feet are in an instant arrested, with an involuntary shudder, and you tremble with surprise and awful admiration on the brink of a tremendous precipice, 1634 feet deep. The basaltic

imis laciniis calycinis insertis, antheris striatis, arcuatis, capsula trigona, trivalvis (duæ sæpe abortivæ,) polysperma. *Seminibus planibus*, caule nudo compresso. spatha 2 phylla. Foliis radicalibus deciduis. Floribus corymbosis roseis. This plant has been figured in Curtis's Magazine, as the *amaryllis bella donna*. The position of the germen is alone sufficient for me to place it in the genus *lilium*, and without this generic difference, the seeds being without wings would make it a distinct species. Great doubts have been entertained as to its native country, and it has been successively given to the East Indies, Africa, N. America, and Brazil. It has already been introduced into England, but lost several times.

[k] Genus. — Globus nudus, sessilis, verrucosus, coriaceus, intus carnosus, compactus, pinguis, ater. Fructif. ignota.

rocks seem to have been blasted and shivered by the great convulsion which rent the foundation strata, and at once created this stupendous valley, enlarged and deepened by the action of torrents which have battered it for ages. The bare cold surfaces of these rocks, rising and projecting in turrets and pinnacles, is finely contrasted by the warm tints of the tufa, and the various greens of the patches of vegetation which occasionally diversify them; whilst the rocky buttresses to the right are profusely covered with laurel and chestnut-trees, and the torrent at the bottom rolls through vineyards and gardens. The peak of Ruivo (the most distant object) is distinguished by the verdure, which reaches to its summit; the crags to the right of it, called by the natives the Torrinhas, or Turrets, vary the picturesque outline of the heights; the inclined summit of the Pico Ariero, which is distinguished, even at the greatest distance, by the band of red tufa which colours its northern base, whilst the glimpse of the sea adds to the impression of distance, vastness, and sublimity, so powerfully excited by the whole landscape. The church of Libramente, and the cottages beneath it look like specks in the abyss, and the stillness of the scene is only interrupted by the rude bells of the goats, as they bound along the precipices. Plate 5.

The singular beauty of the Coural would make every one anxious to draw it; and many I believe have attempted it, but although able artists, their attempts have fallen so short of the reality, that the results have never been given to the world. Travellers who have no reputation as artists to sustain, and who have never produced drawings which would be depreciated by any subsequent failure, may venture to offer the best sketches they are able to make, when thoroughly convinced, that their descriptions will not convey so good an idea of a scene, as even an imperfect drawing. The obstacles which attend such a task, however, seem to defy drawing and water colours; and, in my opinion, the only chance of doing this landscape justice, would be to place an easel on the spot

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Pl. 5

S. Bendick del. V. M. Bayne lith.

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COURAL DAS FREIRAS.

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with a canvass of large dimensions, and there make an oil painting, where every touch would be from nature; the artist giving himself time to seize the most favourable moments only, and which, in the regular climate of Madeira, would occur daily at nearly the same hours: for instance, he should be there at sunrise, to see the peaks without clouds; he must then wait until about two o'clock, to catch the clearest outlines of the rocks of the rugged side; two hours later would throw the buttresses projecting into the abyss completely into view, with every crag and line distinct; and sunset would give him the glow that makes the whole valley so lovely. The accompanying sketch was made in the course of two mornings, and I can only hope that the geologist may be interested by it, and that some skilful hand will yet have time, and feel sufficient interest in the labour, to give the world a correct view of this wonderful scene. It has been remarked, that had the drawing been broader than long, it would have conveyed a better idea of depth, but this was tried, and the proportions would not admit of it; each method of shading, with the light or dark foregrounds, was also tried, but that adopted seemed best to me: this I think is the grand obstacle to success, depth being generally given by the deepest colouring, and by gradually losing outline in darkness, whilst in the Coural, you even distinguish the houses at the depth of 1500 feet, and every line is perfectly clear. The most minute crags, however distant, continue distinct, from the clearness of the atmosphere; and it is almost impossible to preserve a light foreground, from the rich colouring and the quantity of deep verdure. A morning mist was thrown over the rocks of the opposite side, to give distance; and through that mist it was a matter of no small difficulty to preserve the outlines of the crags. The season being unfavourable, hours were spent to catch the peak of Ruivo, and the greater part of the second day's labour was performed in the rain. The dense mists which cover these heights, morning and

night, are evidently referable to the causes detailed in the memoir of Sir Humphry Davy. From the unequal degree and depth of the cooling of the earth and sea, when losing caloric by radiation after the setting of the sun, the surface of the sea, and, consequently, the air which reposes on the sea during the night, becomes warmer than the earth, and the air immediately upon it; both these airs, from the nature of the climate, and the locality of Madeira, are always nearly saturated with humidity, and the fogs or mists which arise from their mixture are unusually considerable, from the depth of the sea and great elevation of the land: the descending current of colder air mixes with the mist as it forms on the surface of the water, whose comparative warmth keeps up the ascent of the vapours, which thus continue to rise until after the appearance of the sun; they cover the volcanic peaks behind Funchal, and at a later hour arrive at those of the other parts of the interior, which they abandon after the setting of the sun for the warmer surface of the ocean. In a country where there is no rain for six months together, these regular mists conspire with the torrents to fertilize whole tracts of land, which would otherwise remain useless.

I started the next morning from Mr. Veitch's Quinta, which is about a mile below the view of the Coural das Freiras, to descend into this beautiful valley on my way to the Pico Ruivo. The road winds for nearly three miles, on the verge of the precipices, before it reaches the point of descent; and a succession of romantic openings, of varied character, left me loth and unable to decide which was the most sublime. I found the *arnica montana*, at a height of 3500 feet, and it is said to grow even on Pico Ruivo: the *echium giganteum*, not only the most beautiful of its family, but in itself a magnificent tree, starts from the clefts of the rocks, and enlivens the rugged soil with its large bunches of blue flowers, and downy leaves. The rocks presented the same alternations

of basalt and tufa, the former covered with greyish-green patches of crustaceous lichens. The *erica scoparia*, and the arborescent heath, (one of which measured eight feet in circumference,) were mingled with the laurels on the sides of the precipices, and in every sheltered nook. A beautiful lichen[l], (belonging to the *idio-thalames* of Acharius,) grew luxuriantly on the *til* laurel. But the wonder and admiration we first bestow on the majesty of the scene is, in the next moment, equally excited by the roads, which the ingenuity and perseverance of man has created here; hewing them out of vertical faces of solid rock, projecting them by walls and earth from the very sides of impending crags, and joining peaks and gaps, which nature seemed to have disunited for ever, as monuments of the great convulsion which rent the bosom of the island. The engineer, Don Joze d'Alfonseca, has immortalized himself by this daring and useful undertaking, which has connected the whole island; the inland barriers, between the various points, having been hitherto pronounced insurmountable, as well as impassable, and a great part of the interior being consequently neglected and unknown[m].

Having rode for some time in a northward direction, we turn to the east, and wind along the very brink of the perpendicular precipices which, like narrow walls, divide the more terrific scenery of the southern abyss, from the milder beauties of the northern. The first of these dividing ridges, for there are three, pretty nearly equal in height, is 4161 feet above the sea, and 2081 above the bottom of the southern Coural. The temperature at

[l] Genus. Frondes coriaceæ, complanatæ, in lobis verrucosis divisæ, et farina atra fronde inspersa, subtus virides. Scutellæ super marginem frondis sessiles, fuscæ, cum margine pallido.

[m] These roads occupied about three years in making, and were finished in 1817. Every man was obliged to contribute a dollar, or two days' labour. The work was frequently carried on by means of scaffoldings from the rocks and precipices.

nine o'clock in the morning, was 51°, and De Saussure's hygrometer marked 89°. The only birds I saw, were the *falco æsalon*, (perhaps a variety, from the difference between some parts of its plumage, and Cuvier's description of the species[n],) an ant-thrush[o], (*myothera, Illig.*,) the red-legged partridge, and a blackbird, only differing from the European species in the colour of the beak, which was dark brown, and merely edged with yellow. The woodcock (*scolopax rusticola*, L.) is found in the mountains, and never quits the island. My mule was sadly worried by the *musca da serra*, which did not appear to me to differ from the *hippobosca equina*: the guide insisted that it only fixed itself on the animal for warmth, and did not suck the blood, begging me to look at its talons, which bore two nails, much indented, but the proboscis and its sheaths were very evident[p]. The Pico Ruivo faces the beginning of the descent into the Coural; the beetling rocks and broken peaks, over which the clouds are sailing, seem to threaten to overwhelm us at every step, and we involuntarily withdraw our eyes from these impending ruins, to fix them with a shudder on the more startling depths immediately beneath us, and sometimes on both sides of the artificial wall, along which we frequently descend. There were several picturesque streams and falls of water, but it wanted the torrents, which follow the heavy rains, to complete the sublimity of the scene. The road sometimes curves round like a bastion, and

[n] The upper part of the bird was of a reddish brown, with dark brown horizontal stripes; the under, whitish with longitudinal blackish brown spots, diminishing in number upon the thighs, the lower part of the belly was quite white, the *envergure* measured two feet three inches, and from the end of the beak to the end of the tail was one foot two inches.

[o] The head, back, wings, and tail, were of an olive brown, the belly whitish; the throat, breast, and space between the eye and the beak, orange: it measured 5½ inches from the end of the beak to the end of the tail; the tarsus was 1¼ in. long, and the tail 2 inches.

[p] The antennæ were short, bearing tubercles with a hair.

a single and sudden turn transports us from brilliant sunshine to a thick mist, from the deep shade of a laurel grove to the broad light of an abrupt break, with a glimpse of the sea. Vast insulated rocks raise their heads in broken turrets and spires, and look like the ruined fortresses of some gigantic race, entombed beneath the huge blocks of basalt, which have been sundered from the mass above, and rolled down towards the valley. These immense fragments, eternal monuments of "the wars between the torrents and the mountains," seem, sometimes, to be so nicely balanced on a single point, as only to await the violence of the storm to precipitate them into the bed of the stream. The mouldering trunks of large blasted trees contribute to the solemn grandeur of the scene, which is varied in colour by the warm red of the tufa, the cold grey of the basalt, the very different shades of the evergreens, ferns, broom, and moss; and the frost-like, silvery appearance assumed by the decayed heath trees. The moss, *hypnum intricatum*, was the only one I could see or hear of; it abounds even at the greatest heights, forming a rich, velvet-like verdure, when combined with the smaller *gramineæ*, and the young shoots of the *ericæ*, which are so beautiful when putting out their first leaves; this *hypnum* also grows on the *thallus* of the *til* lichen. Having reached the bed of the torrent, we look around, and feel as if we were in an amphitheatre of unscalable rocks, without a single outlet. The small valley, through which a few miserable huts are thinly scattered, presents flourishing vineyards, and smiling gardens of cabbages, pumpkins, and sweet potatoes, (*convolvulus batata*). This is the highest point at which the vine is cultivated in Madeira, for making wine, and its success is entirely owing to the nuns of Santa Clara (to whom this Coural[q] belongs) having given up

[q] I have taken some pains to ascertain the meaning of the word *Coural*, which we do not find in the Portuguese dictionaries, and am assured, on native authority, that, coupled with *das Freiras*, it means the "*Nuns fold*," *i. e.*, the place of their retreat,

their share of the profits, to their tenants, for the first seven years. It is 2080 feet above the sea; the temperature of the air was 63°, at eleven o'clock in the morning, and De Saussure's hygrometer stood at 74°, or 15° lower than on the heights above.

The bed of the torrent is crossed by stepping from one rolled mass of basalt to another, and that with some uncertainty, especially when they are slippery from the rains; then turning to the left, you continue for some time along a tolerably level path, and pass a romantic little bridge with a waterfall, on the right. It seemed as if every turn would terminate my progress, by bringing me directly in contact with the towering walls of basalt and tufa, which faced me in all directions. We then commenced the steep ascent of the Lombo Grande, first, through thick and close bushes of broom, which, at a higher point, became mingled with ferns: the distant mountains loomed through the mist, like the first appearance of land at sea. My guide, who, it turned out, had never been to the Pico Ruivo, missed, or rather was ignorant of the obscure turning which is to be taken on the right hand, about two-thirds up the Lombo Grande, and we continued straight forward in the same path until we met a countryman, who told us we were wrong, and conducted us down to the turning off. We had not proceeded 300 yards, before a small avalanche necessitated my leaving the mule behind, and indeed made our own passage rather nervous. We proceeded at a pretty brisk pace, considering the steepness and ruggedness of the path, for about two hours, when my guide announced that he had again missed the path, that the peak was two hours distance to the south east, and that we should be benighted in our attempt to reach it. The clouds above us were frequently scattered in the finest particles, which seemed in their turn to dissolve into æther.

in case of the invasion of the island by foreigners, or any other attack or outrage upon their convent or persons.

We hastened our descent, and I scarcely dared to stop a moment to contemplate the new beauties which the setting sun shed over the scenery, my guide was so impatient and apprehensive; as it was, we did not reach the margin of the torrent until dark. My first care was for my barometer, which being Fortin's, was rather unwieldy in the hand, and, afraid to venture to step from stone to stone with it (for the guide had enough to do to get the mule through), I jumped into the water, and immediately repented having done so, for though the depth was never above my waist, its force was so great, that without the assistance of the guide and the large stones, I must have been swept down by it. The barometer, however, was uninjured, and we began to grope our way in the dark, in the hope of discovering some light in one of the cabins to make to; sometimes rolling over one another, sometimes falling off a bank, and sometimes dragged down a partition wall by the mule slipping off it. In short, there was but one thing evident, that we had missed the path altogether, and my guide began to cry and roar, accusing me of bringing him there to die, while I sat down on a bank, determined to pass the night there rather than break my shins any more, and holloa'd lustily. Our united efforts, although in very different strains, (my guide persevering in the bellowing part of the duet,) brought a peasant with a torch to our assistance, who conducted us in about half an hour to a filthy cabin of a single apartment, full of children, smoke, and vermin. His wife, however, dried part of my clothes by the damp twigs which were cracking on the earthy floor, with great care and good nature, and placing a log of wood beside me, covered it with excellent grapes, and a large cup of the pure juice of the tinta. The husband was easily persuaded to provide torches, (made from what appeared to me to be a *festuca*,) and guide our ascent out of the Coural; for I felt very anxious to judge of the effect of torch-light on these sombre scenes, and I was fully recompensed,

although shivering with cold the whole way. One slip would have been a slip into eternity; but the thought of danger was diverted by the clouds which were still rising out of the valley, and which, frequently concealing the precipices the torch would otherwise have disclosed, seemed to assure our steps by the impression, that we were riding on the margin of some vast rocky lake. My guide tied a handkerchief over his head, leaving it to float out behind from beneath his sharp pointed cap, tucked up his trowsers, pulled up his swarthy boots, which looked like a skin shrivelled and discoloured with age and dirt, let his shirt hang loose over his waistband, and waving the torch every touch and turn to keep it in, preceded me, looking like the most haggard of wizards: as I shrunk from the breeze and looked around me, I could not but recall the words of Ossian, "Ghosts ride on clouds, and fly upon the winds, and meet together in some secret cave to talk of mortal man." I arrived at Mr. Veitch's quinta in about three hours.

My next attempt was more successful. I slept in the Coural the night before, and starting before sunrise, was on the top of the Pico Ruivo by half past nine in the morning. We passed through thickets of the *clethra arborea*[r], *vaccinium cappadocium*, and laurels, before we reached the arborescent heaths, which contribute with the thick grass to give the peak its unusual verdure: the *mentha* and *melissa* shed their fragrance even on the summit, and the purple *digitalis* presented itself very nearly as high. There was not a cloud to be seen when we first arrived, and the broken volcanic peaks, the abrupt breaks, and deep abysses, which met the eye in every direction, almost led me to feel like one who, surviving some great convulsion of nature, had crawled to the highest eminence to contemplate the ruins of a divided continent. The

[r] This *clethra* does not seem to me to have been well described, or else it is a different species: it has no bracteæ, the ovary is covered with hairs, and the stigma is forked at the top.

scene was soon changed; the clouds advanced at first like vast floating glaciers, but soon formed an entire sea, from which the points of the peaks emerged like desert rocks and breakers. I did not quit the summit until noon, when the thermometer stood at 49 in the shade, and at 80 in the sun; De Saussure's hygrometer remained at 57, for there was not a cloud above us; and the electrometer, armed with its conductor and elevated, was not affected in the smallest degree. I made the height of the peak 6164 feet[s], (or about 650 feet lower than the range of hills considered as the base of the Peak of Teneriffe,) and I think it was impossible for the day to be more favourable[t].

[s] Barom. 619.65, T. 9.45, T.d. 9.45 c. 49 F: in the turret of Mr. Veitch's house in Funchal, 154 feet above the level of the sea, (allowing seven feet for the rise of the tide at the syzygies, when the height of the turret was determined,) 770.70, T. 20.5, T.d. 20.5 c. 69 F: $T - T' = 16^m\ 2$; $\frac{1720}{1000} \times 2\,(t + t') = 103^m\ 2$; correction for latitude, 8^m.

[t] For the Peak of Teneriffe to be visible from Ruivo, it would require the latter to be upwards of 18,000 feet high. "M. Cordier mesura le Pic de Ténériffe, le 10 Avril, 1803, en employant un excellent baromètre qu'il avoit fait bouillir la veille, et par un temps très-beau et très-constant, qui se prolongea pendant un mois. Les instrumens étoient placés au vent du Pic, et la hauteur barométrique fut ramenée à la température de l'air ambiant . . . . . M. Cordier a tenu compte des petits changemens de niveau dans la cuvette, et ce physicien, très exercé aux mesures barométriques, a pris toutes les precautions nécessaires pour obtenir un résultat exact." M. Cordier's observation, calculated by La Place's formula, gives 1920 toises, or 12,162 English feet. *Voyage de Humboldt*, l. 1, c. 3. In a MS. communication of Dr. Savignon's, (a Spanish physician resident at Lagunæ,) the summit of the Peak is stated to be 12,208 English feet, with the following observation: "Orotava stands 1042 feet above the level of the sea; the range of hills, which may be considered as the base on which the Peak of Teneriffe rests, 6810 feet, and the base of the sugar loaf, 11,670 feet: these heights are the result of a series of observations made by several intelligent gentlemen of Teneriffe, and agree extremely well with those made by Baron Von Buch and Professor Smith in 1815." I need not add, that Baron Von Buch (whose work I have not yet seen), as a scientific traveller, is allowedly second only to Baron de Humboldt. I merely mention these two barometrical observations, differing only forty-six feet in a height of 12,000, because they seem to have escaped the attention they merit. See *Journal of Science* for March, 1823, p. 79.

I had taken the angle of elevation of the Peak of Ruivo with a reflecting circle, from the point generally visited by strangers for the best view of the Coural, and adjoining the Pico das Bordas, knowing that I could get its horizontal distance from Ruivo very accurately from Lieutenant Colonel Paulo Dias d'Almeida's survey, just completed, after six years' labour, drawn originally on a scale of twenty-eight inches to a Portuguese league, and containing every quinta on the island. My own attempts to get a sufficient base by angles from a smaller one, measured with the aid of an artificial horizon of crystal, and a proof telescope, *(lunette d'epreuve,)* failed from unfavourable weather.

6°	6′ 20″	Apparent angle of Ruivo.
	26	Refraction[u].
6	5 54	Which, with 24,805 feet for the horizontal distance, gives 2578
		Height of apparent, above true level, for 24,805 feet . . . 15
		Height of point of view above the level of the sea . . . 3710
		Height of Ruivo 6303

being 139 feet more[w] than that given by the barometer, which was Fortin's, and had been compared with that of the observatory for several weeks. M. Von Buch, and Professor Smith, found the Torrinhas (notoriously lower than the Pico Ruivo) 5857 feet above the sea[x]. These circumstances considered, I cannot help

[u] To estimate the terrestrial refraction, (not having Lindenau's tables of negative coefficients,) I followed the method recommended, I think by Pictet, at the end of the first volume of De Saussure's Travels; calculating (by Dr. Young's tables) the astronomical refraction at each station, for the angle of elevation under which Ruivo is seen from the lower, (knowing the height of the barometer for each,) and taking the half on the supposition, which may be made without any sensible error, that the curve between the two stations is circular. This gave me within a fraction of what Dr. Maskelyne allows, *viz.*, $\frac{1}{10}$ of the intermediate arc: but, if the consideration of the refraction were neglected altogether, it would not make a difference of six feet.

[w] M. Pictet's measurement of Mont Blanc, from the glacier of Buet, in a similar manner, exceeded De Luc's direct barometrical measurement by 210 feet.

[x] *Narrative of an Expedition to explore the River Zaire. Introduction*, p. lxviii. Ruivo was not accessible at the time of their visit to Madeira.

feeling some confidence in the result of my own observations, although I observe by Captain Sabine's recent article in the *Journal of Science*, that he made it only 5438 feet above the level of the sea. Baron de Humboldt found the decrease of caloric at Teneriffe, to be ninety-four toises for every degree of the centigrade thermometer; De Saussure, at Etna, ninety-one toises; my observation gives eighty-nine toises, or five less than De Humboldt's; but Captain Sabine's gives only sixty toises for a centigrade degree, or thirty-four less than De Humboldt[y]; this would seem to be a further evidence in favour of the greater height of Ruivo.

My next route was northwards to St. Vicente, which is about twenty-five miles from Funchal, passing first along the brink of the Coural or ravine, into which I had already descended, and then on the very margin of a second, scarcely less bold, but less awful, and much more luxuriant in vegetation. Woods of laurels line the declivities along which the road is formed, and wooden bridges are thrown over the frequent torrents, near one of which the basalt rock assumes the form and detail of a ruined castle so happily, that it seems to defy the pencil to draw any thing else. Beyond this, the distant sheets of broom look like sloping lawns, occasionally diversified by the mellow brown of decaying ferns. Here I first saw the beautiful fern *asplenium palmatum*. The filices form by far the most interesting family in Madeira, verifying Baron de Humboldt's remark, that their maximum may be found in the mountainous parts of small islands: it will be seen that several are new[z], and all were highly luxuriant, yet I was disap-

[y] Temp. at Ruivo, 36° F., at Funchal, eight feet above the sea, 61.5. *Journal of Science*, xxix. p. 82.

[z] For a more particular list of the ferns I must refer my readers to the Appendix, No. 1. The *P. vulgare* therein mentioned, I think must be a variety of that species found at Teneriffe by M. Leschenault. The *aspidium palmatum* I believe to be rare;

pointed at not finding the *dicksonia* mentioned by the above author, or a single arborescent fern. The basalt and tufa dip to the north, beyond the ridge separating the two Courals, and continue to do so all the way to St. Vicente. The compact basalt is still uppermost, and its depth is considerably greater than at the water-side; the lower masses are occasionally in an advanced stage of decomposition, apparently from the effect of the springs issuing out of them. From the deflections of the streams of basalt and deposits of tufa, (principally on account of the hills and valleys of the primitive island, which have also caused the great variations in the depth of the basalt, and of the existence of which we shall find positive evidence at St. Vicente,) the dip, though generally rapid, frequently varies, and consequently we form the best idea of its great inclination towards the sea, by recollecting, that the same beds of columnar basalt and red tufa, which are not 100 feet above the water, close to the beach, are found at a height of 4500 feet in the interior, and that at an horizontal distance of only $7\frac{2}{3}$ geographical miles, or 46,843 feet from the sea, which gives an angle of 6° 17′. As you approach St. Vicente, you discover dikes descending through the tufa, and the basalt which composes them is full of crystals of basaltic hornblende, and occasionally of pyroxene: I must own, however, that I could not have distinguished the latter, either by its lustre or conchoidal fracture. The descent

each frond rises on a slender black stem, and sometimes to a considerable height. The *A. hirsutum* resembles a fern found by Olivier in Candia, and not yet named. I have, therefore, given mine the above appellation, from the thick short hair at the back of the fronds. The two following species I believe to be quite new.

Genus *Lomaria?*—Frondibus linearibus, semicylindricis, uni-nervatis. Fructificatione totum frondis discum tegente. Tegumine intrà dehiscente. Sp. *L. semicylindrica*. B. Genus *Aspidium*.—Fronde simplice, foliis obliquis oblongis. Fructif. in lineis brevibus, marginem foliarum tectente, folliculis anello elastico circumdatis. Sp. *Asp. lobatum*, B. I have recognised this fern in Vaillant's *herbier*, but it was not named.

to St. Vicente, though scarcely two miles, is more fatiguing than the whole journey, being very steep, and covered with blocks of basalt. The high range on the left is full of basaltic dikes, projecting like buttresses from the tufa, and mantled with evergreens; they have evidently descended from the Poul, and are frequently in such an advanced stage of decomposition, as to be sectile, acquiring an orange yellow colour. The first village is miserable, and is about 3½ miles from the sea. I turned to the eastward, towards the towering basaltic rocks which appeared there, and after walking about two miles through vineyards, and gardens of orange trees, and crossing two torrents, the one by a tottering bridge, I ascended for about half an hour by a rugged winding path, and found a similar limestone to that which I have before described, beneath the basalt at Lisbon. Generally speaking, however, it is of a whiter colour, more crystalline in its texture, contains very little imbedded siliceous matter, and scarcely any compact masses; yet from analogy, and from the great depth of the bed, (being nearly 700 feet from its junction with the superincumbent basalt, to my last glimpse of it in the bed of the torrent, nearly level with the sea,) without a single alternation, I have no doubt of its being transition, rather than primitive limestone; its more crystalline texture is probably owing to its vicinity to the basalt. The drift line of the junction is horizontal, and the limestone has evidently been deposited regularly and tranquilly, without the smallest trace of disturbance or confusion. Continuing about a furlong to the northward, and descending a water-course, (about a mile in a direct line from the beach,) I found dikes of decomposing basalt intersecting the limestone, which, from their form and direction, I should say had evidently descended from above, and, instead of filling up from below, had flowed into the gaps created in the limestone by the convulsions which rent the ori-

ginal structure of Madeira, and preceded its new form. The rock directly in contact with, and above the limestone, looked in some parts like a conglomerate of small nodules of basalt, imbedded in an indurated tufa, with stripes and patches of lime; but it lost this character two or three feet above the limestone, and became a simple rock, of a chocolate brown, and greyish red, with lines of buff, losing all effervescence, and somewhat of a slaty structure. Its entire depth, however, was only 4½ feet, and the heights above, which rise to nearly 1000 feet more, were composed (as far as I could judge without ascending them, which was impossible) of beds of basalt and tufa, intersected by basaltic dikes. The altered basalt of the dikes intersecting the limestone, would perhaps be called wakke in the cabinet, having acquired a brownish hue, and its specific gravity being reduced to 2.7 or 0.2 less than that of the ordinary compact basalt of Madeira. The unknown cause which threw up the vast masses of basalt and tufa, which now envelope the island so deeply, that it seems to be exclusively composed of them, must have resided far beneath this bed of transition limestone.

I reached the middle of St. Vicente, or rather Sta. Magdalena, which seemed to be a separate village, by four o'clock; and having rested a little, I determined to follow the banks of the torrent to the sea, which did not appear to be more than two miles distant. The vines, trained around the lofty chestnut trees, crossed the road from one to the other, interlacing like a natural trellis work, to shelter the road from the sun, and reminding me of the creeping plants which connect whole forests in Africa. The two villages nearest the sea, seemed neater and better built; that in the hollow was sheltered from the north wind by a natural wall of tufa, and contained a good church, with a very snug looking house for the vicar adjoining, which seemed to promise a clean

bed, old wine, and fresh marmalade to any welcome guest. An insulated hollow rock stood on the beach at the mouth of the torrent, and with the simple addition of a door and a few steps, had been converted into a chapel;

the vast cliff of tufa on the east, seemed to threaten to overwhelm it.

I met the Padre, a very respectable looking man, taking his evening walk, with, as I was afterwards told, the principal family of the neighbourhood. The old lady seemed to be asserting her right to an interference in some of the affairs of the parish; two awkward-looking young men followed at a short distance, arm in arm, and left a handsome-looking girl to walk behind them, entirely alone; she returned the salutations of the peasantry with the prettiest grace imaginable. Perhaps this poor girl was destined to be thrown away on one of the insensible beings who were strutting before her, for choice has nothing to do with Portuguese marriages, until widowhood leaves a female her own mistress. I was favoured with a bow by each of the party, although my white jacket and trowsers, so nearly approaching the garb of the peasantry, did not entitle me to it, in the first instance; I would have gone without my supper, hungry as I was, to have been allowed to pass the evening with them. I took up my quarters for the night in the remaining part of the habitation of the ancestors of a lady, whose weekly quadrille parties, and brilliant annual ball, I

had so much enjoyed at Funchal. A chapel close to the house, still gave Donna Anna a control over the fêtes of the village, and I could not help wishing she would occasionally visit this neglected spot, although I could not exactly say what pleasure a lively, elegant woman, the soul of Portuguese society, should find there: indeed, it seemed cruel to wish her to bury herself for a moment at St. Vicente, merely from my formal antiquarian sort of respect for her ancestry, when I knew from experience that every party would be incomplete, if not dull, without her. When the only living representative of a family is a charming woman, to whose society and accomplishments we have been indebted for many pleasant hours, it is impossible to visit the remote and neglected residence of her forefathers, without conjuring up a thousand delightful forms, as we sit alone in the gloomy *sala*, watching the setting sun through the cobwebs of a shattered window. The ruins of the family chapel spirit up a vision of the old Padre receiving the artless confessions of a train of blushing beauties, whom we have lived just too late to know. The father too, no doubt, was hospitable; the mother, kindness itself; we feel determined to admit no unpleasant shade into the picture: the priest was more cheerful, the wine was better, for the grapes were less neglected; the cedar roofs re-echoed with guitars, and there was not a dance once a year, as there may be now, but every evening. Darkness rouses us for a moment from our reveries, as if to suggest that they might lead to still more pleasing dreams. The *feitor* or steward, however, thought a lively interlude would be as well between the waking vision, and the dream of departed forms, and served up a capital soup, a fat fowl, a plate of oranges, and a bottle of wine, before he strewed the bed on the floor, placing a wax candle by the side of it, which I suspect he borrowed from the church, and which the rats devoured before five o'clock in the morning.

My last excursion in this part of the interior of Madeira was to the Poul de Serra. We slept on a bed of dry fern, and in view of a blazing fire, in one of the huts raised for the shelter of the inspector of the roads, and started about an hour before day-light for the Poul, which we reached soon after seven o'clock. It is a vast *plateau*, or table land, about nine miles long, and three broad, sometimes covered with a sandy soil, sometimes with rich pasturage, and less frequently, with mouldering tufa and basaltic rock. There were several patches of ice in the earliest part of the morning, and the thermometer was as low as 42° at eight o'clock. It is 5159 feet above the level of the sea, and might be made very productive, had the Portuguese any spirit or knowledge as agriculturists. At present it is the Hartz of Madeira, and the peasants who live at some distance, when obliged to traverse it in their journies to the westward, do so with a hurried step and fearful eye, looking for some malignant goblin, or offended spirit, in every cloud that settles around it: the most alarming stories, however, are generally traced to the four or five families who live beneath its brow, and get a better livelihood than ordinary, by cutting firewood, and feeding cattle on it. The *vaccinium cappadocium* abounds in thickets of small trees, and the peasants make vinegar of its berries. The *sonchus radiatus* grows to a large size, and serves as food for innumerable rabbits, all of which are said to have descended from a single doe, which littered on board Prestrello's ship, who was the first governor of Porto Santo[a]. I saw nothing to interest the geologist, unless it was several of those faint, and more or less circular depressions, which some have imagined in Europe to be traces of craters, without reflecting, that the original base on which these volcanic *plateaux* rest, were probably plains, and that, if the basalt first flowed from an opening made in the middle of a plain, it would form a *plateau* without

[a] *Collecçao de noticias*, p. 8.

leaving any vestige of a crater. Here I had the gratification of seeing the Manta for the first time, a new species of eagle, connecting the divisions *haliætus* and *pandion of Savigny*, and which ought, perhaps, to form an intermediate one, under the name of *limnætus*: first, because the same natural character which has separated the *haliætus* from the *pandion*, separates the *limnætus* from both, for its nails instead of being grooved underneath as in the former, or round, as in the latter, are perfectly flat; and secondly, from an equal difference in its habits, for although evidently an aquatic eagle from its half-feathered tarsi, it neither frequents the sea like the *haliætus*, nor rivers, like the *pandion*, but haunts the pools and other stagnant waters of the mountains, and feeds on water-insects and worms, amphibious reptiles, grylli, and small birds, but not on fish[b]. Returning leisurely, and in broad day, I could not but be struck with the numerous basaltic dikes which advanced from the heights, and projected into the valleys and ravines, like buttresses or bare walls. It was every where evident that these dikes had intersected beds of tufa, which had been decomposed and washed away by the rains and torrents, and the frequent occurrence appeared to me to have contributed considerably to the formation of the small valleys and ravines, and to their fertility, being thus naturally covered with what is considered the best soil in the island. It is also evident, that these vast, irregular deposits of tufa cannot have resulted from decomposition, but must have been poured out as an irruption, before the basalt. The prisms met with in different parts of the road from the Coural to the Poul, are of various sizes, of a more compact basalt, and, generally speaking,

[b] Back and head, brown; tail, light brown, with transverse bands of the darker brown of the back; throat and belly yellowish, with transverse waves of dark brown; inside of the wings whitish, with similar waves; tail square, with ten long pen-feathers; tarsi, yellow; length, one foot nine inches; *envergure* four feet one inch. The gastric glands descend into the stomach in four longitudinal bands.

much more symmetrical than those at, and near, the water-side, proving that Dolomieu's opinion, that it is the effect of their sudden cooling in water, is unfounded. It is every where evident, that this structure is accidental, and arises from divisions subsequent to the formation of the mass. On my way back I found the *sium falcarium*, growing to the size of a large shrub. I returned to Funchal, by the Pico da Cruz, which affords a fine view of the peaks of the interior, and of the Jardin de Serra, as may be conceived from the accompanying sketch, Plate 4, B.; it is 3237 feet above the sea. I also passed over the peak of Giram, (the highest land seen to the westward of Funchal, on entering the bay,) which I found to be 2185 feet above the sea.

Going close along shore in a boat, to the westward, and passing the natural section, which I have already described, and which is terminated by a ravine, we lose sight of the tufa, which has either slipped beneath the sea, or has not been deposited in this direction. The basalt, which appears to be a continuation of that reposing on the tufa on the eastward side of the ravine, forms the cliffs exclusively, and is mixed with a confused deposit, like indurated mud, which would seem to have flowed out of the crater at the same time, rather than to have resulted from decomposition. It is in this basalt that the *plomb natif volcanique*[c] of M. Haüy was found. We next pass a basalt which is particularly scoriaceous and cellular where it has reached the sea, and continuing, we observe that it afterwards presents, in its more elevated parts, immense patches and bands of earth, resembling tufa, and seemingly resulting from

[c] "Amorphe, en masses contournées;" there is a specimen in the cabinet of the Jardin des Plantes, but not a vestige of it is to be met with in these rocks at present; and Don Joze de Vasconcellos, who was with M. Ratske when he found it, tells me, that the quantity was exceedingly small, and that he never could discover any other trace of it since, although he has frequently searched. Lead, galena, has since been found in the basalt near Durham.

decomposition. This conducts us to detached and insulated rocks of columnar basalt, washed on all sides by the sea, and remarkably scoriaceous on the upper part. We then arrive at projecting ridges of basalt, which have preserved the same inclined plane in which they flowed into the sea; columnar basalt then prevails for some distance at the edge of the sea, and rises to about sixty feet above it. The red tufa afterwards becomes evident, beneath the upper basalt, which is out of the reach of the sea, but columnar; those are the remains, however, of ridges of the lower, or cellular basalt running out into the sea. These are followed by a fine beach and bay, free from cliffs and elevations, like that in which Funchal is built, and owing entirely to no streams of basalt having reached, or flowed towards the sea in that direction. This beach is terminated on the western side by strata of tufa, dipping rapidly to the south; and between these and the Ribeiro dos Soccurridos, the lower and upper basalt are disclosed with the yellow tufa between them. Before we reach Camera de Lobos, we discover a third alternation of basalt, divided from the second, which we have hitherto called the lower, by a deposit of red tufa. Camera de Lobos lies behind detached rocks and ridges of scoriaceous basalt, and close to it we first remark the basaltic dikes descending through strata of yellow tufa, scoriæ, and red tufa, all of which are above the basalt. The stupendous cliff which follows, Plate 4, A. presents a grand slip to the eastward, and the whole depth, a perpendicular sheet of 1600 feet, is composed of strata of basalt, alternating with red tufa and scoriæ, and intersected by numerous basaltic dikes (some of which have been disunited by subsequent slips), running from the top to the bottom. Looking at these frequent alternations, can any one hesitate to give up the hypothesis, that the scoriæ have been produced by a series of volcanic eruptions, which have forced through, covered and scorified the upper surface of the basalt, after the waters had deposited it? It is

scarcely possible to conceive such a regular succession of aqueous deposits and volcanic injections; to admit (which we must also do) that the sea has been 1600 feet above its present level in this part is a minor difficulty, compared to the former, especially since the ingenious hypothesis, founded on the unequal expansibility of land and water under an alteration of temperature. But we must recollect, that no change in the level of the ocean, nor even a forcible elevation of the island from beneath the water, is required in admitting that the basalt is of igneous origin, (as its streams and nature indicate) and has flowed from a crater opened through the transition limestone found at S. Vicente.

A fall of water, of one shallow, and two deep stages, descends the whole depth of the western end of the cliff, which adjoins the Fazenda dos Padres, perhaps the finest malmsey plantation in the island, and created entirely by an *avalanche* of tufa, which, falling from a height of upwards of 1200 feet, has lodged and spread at the bottom of the cliff.

The house and vineyards are only accessible by water, to those who shudder, as most persons do, at the daring route of the labouters, who ascend and descend the cliff by a succession of simple stakes driven into, and projecting from it. These avalanches, which are not unfrequent, (and which have occurred from lesser heights without much injuring the property) with one or two sliding plantations, occasion curious suits in the courts of Madeira; the one party insisting that he must follow his grounds and habitations, the other, whose less valuable grounds have been covered or enlarged by the accident, pleading, I presume, "cujus est solum, ejus est cœlum."

Ascending the rocks between the Fort and Praya bay, we find, close on their brink, about 80 feet above the sea, and but a few yards inland, an elliptical, funnel-shaped depression of 520 feet in circumference, and about 35 feet deep. The greater axis bears

S. 7° W., and, within, (a little northwards of the centre, and about 35 feet below the brink) is an aperture about 25 feet long, and 15 broad, through which you see the sea; the walls of the caverns resounding with the rush of the waves entering below. The depth of this vast marine well, a term which I merely hazard for the moment, as conveying a better idea of its position and appearance than any further description could, is about forty-five feet. This rent, apparently too considerable to be attributed to the mere elastic force of confined vapours, presents every evidence of having been formed by a minor volcanic heave, which threw up vast blocks of the rock it rent from beneath the ocean, to form a passage, but did not eject any lava or contents of its own. For both the basalt rock in which it is formed, and that of the vast masses which are scattered at the mouth of the aperture, are highly scoriaceous, and present the strongest traces of fusion on the surface. The elliptical wall which rises thirty-five feet above this fearful aperture, and forms the greatest circumference of the funnel, is of tufa, dipping to the south, and which, yielding more easily, has been undermined, and has fallen in to a greater extent, from the same heave which rent the stubborn rock beneath it; the shock having spread as it proceeded upwards through these looser and softer strata. The compact basalt, which covers the tufa in many instances, is wanting in the present, and the nearest coulie of it inland, or behind this aperture, diverges from it, and may be traced to the sea without approaching it, so that no superincumbent weight could have contributed to the falling in of the tufa. There is not the smallest trace of any ejection from the aperture having streamed over the wall of tufa, indeed there is not the smallest evidence of any thing having been thrown or forced up, but masses of the rock which was rent by the heave. Some of the masses of porous and scoriaceous basalt scattered near this aperture, are thinly coated with chalcedony. The Loo rock may have

been separated from the shore by a similar volcanic effort, (subsequent to that grand burst and ejection which covered the face of the primitive island) aided by the long-continued abrading action of the sea. I here found the *cheiranthus mutabilis*; I understand it is constantly purple, (in various shades) when growing by the sea-shore, and that its variations of colour depend, not on situation alone, but on soil. I must also describe a plant, which, from the novelty of its fructification, I cannot refer to any family; its leaves first induced me to suppose that it belonged to the *sempervivæ*, but no other character accorded, and I must leave its decision to a future traveller, who may procure a better specimen, reserving to myself the pleasure of naming it after my friend the Provost of Eton[d].

The first excursion I made to the eastward, was to the Brazen Head or Garajaó. Descending the hill to the ravine crowned by the Fort, we find basalt reposing on a shallow deposit looking like a harsh, indurated, ferrugineous mud; beneath which is the red tufa, so heavily charged with basaltic nodules as to resemble a conglomerate. As we pass over the bridge, we observe that the streams of basalt have flowed about S.S.E. from the interior of the island, and ascending the eastern side of the ravine, we find the mud-like deposit mixed with, or between the basalt, which forms prolonged, inosculated, shallow vaults above it. The red tufa beneath has evidently been deposited in fine layers, and where it has partially slipped, or given way from the superincumbent weight of the basalt afterwards flowing over it, it has led to correspondent inflections and depressions in the strata of basalt above it. I can-

[d] Genus. *Goodallia*. Radix fusiformis. Folia succulenta; juniora a medio in modum monocotyledonum nascentes. Caulis herbaceus, scapiformis. Capsula placenta centrale, 4 valvis, in medio transverse patens, et postquam matura cum placenta et valvis exiliens: plurima semina, minuta, rotunda, atra, in parte inferiore capsulæ persistentia. Sp. 1. *Foliis trilobatis*. Sp. 2. *Foliis linearibus*.

not consider this indurated mud-like matter, which is generally charged with basaltic pebbles and fragments, as originating in the decomposition of the basalt itself, but rather to have been created in the crater by a different proportion of the constituent elements, and to have flowed from it, intermingled with the streams of basalt. The yellow tufa, which is here above the basalt, is thickly sprinkled with small pumice-stones. The *cassia acciminata* covers the road side in all directions, mingled with *cacti*, *pelargonia*, roses, fig-trees, and ivy; four or five small dragon-trees add to the variety. Having ascended about 2000 feet above the sea, we meet with plantations of the *pinus sylvestris*, which are said to have been made, with the view of binding the loose red soil, which would otherwise be scattered, and slide away over the cliffs in the rainy season. The deep red tufa, however, which forms this soil, and which rests on the yellow, seems to be more aluminous here than on the western side, and firmer; perhaps from the number of basaltic dikes which intersect it, running towards the sea, and generally presenting a series of close horizontal fractures, as if it had not flowed very rapidly into the rents of the tufa, but was deposited in layers. Masses of basalt crown the tops of all the hills, but are in no instance columnar; and the remnants of streams of basalt connected with these masses, and descending over the tufa into the sea, are constantly evident. Descending the ravine from which the path to the summit of the Brazen Head branches off, the red tufa, which just above it had been full of large nodules of basalt, appears to be charged with a kind of pumice grit, and dips S.S.W. in an angle of 30°; a natural cross section at your back, running east and west, discloses this tufa in horizontal layers with the basalt above it.

Looking down at the Brazen Head, from the lofty cliff adjoining it on the west, we observe large masses of columnar, mixed with angular, irregular pieces of basalt, (sometimes scoriaceous) imbedded in red tufa. The grand slip to the south will be best

conceived from the drawing, Plate 6, which gives the different appearances and colours of the tufa, of the dark scoriaceous matter between, of the imbricated-looking basalt beneath, and of the principal dike, which is three feet four inches wide; the smaller sketch, Plate 3, D, taken from a higher point, and at a greater distance, should be referred to at the same time. To the left of the part represented in the larger drawing, the dikes descend through red tufa, which reposes on scoriæ. The descent to the beach is rather difficult, and I slid the greater part of the way over a black cinder, the basaltic masses above which are covered with ivy. Walking close up to the dike, I found that the yellow tufa was full of small, (occasionally intermixed with large) sharp, irregular fragments of basalt, while the red generally contains larger masses, and is more layer-like in its deposit. This slip has evidently occurred from the giving way of the tufa, beneath the basalt, covered by the sea. The *euphorbia dendroides*, the *ruta graveolens*, and a new species of *gnaphalium*, grew close to the beach, the latter extending itself up the rocks[e]. In the pores of the nodules of basalt which had been rounded and thrown upon the beach by the sea, I found the *galeolaria elongata*, and the *vermilia bicarinata*, both of which have been hitherto referred to New Holland alone[f]. The latter was of the most beautiful rose colour, gradually passing into white; its double keel, sometimes indented, and its aperture with two teeth, would not admit of any doubt; but the animal, as well as that of the *galeolaria*, had perished. Without a minute examination I should have oro-

[e] Genus *Gnaphlium*, an *tomentosum?* Floribus flosculosis luteis, (fœminei hermaphroditis mixti) corollulis integris, vix manifestis. Calyce persistente, imbricato, ventricoso, squamis acuminatis, scariosis, luteis. Pappo capillare. Receptaculo alveolato nudo. Caule suffruticoso racemoso. Foliis alternis, ovatis, oblongis. Floribus terminalibus corymbosis. *Planta tota, valdè tomentosa, canascens*, odorata.

[f] Bowdich's *Elements of Conchology*, Part II.

nounced the nodules containing the *galeolaria*, to have been amygdaloidal, the remains of this *tubicola* having at first sight all the appearance of an earth, subsequently deposited in the pores of the basalt. Very small *balani* also adhered to these nodules. I met with two species of *trochus* on the same shore, and the *turbo edulis*, which adheres to the rocks, and is generally eaten by the natives: two species of *helix*[g] lay upon the rocks out of reach of the sea; the animals had left the shells, which had probably been rolled down from the top of the cliff. In a recess upwards of 150 feet from the sea, and nearly as high above its level, I was surprised to find rows of stalactites of muriate of soda, frequently a foot long, pendant from the red tufa like so many icicles, and terminating in nodules of the same salt, as large as the half of a duck's egg. Breaking off some of the masses, the salt appeared to be spread over the interior surface, as if the tufa was impregnated with it; nor is this improbable, when we recollect, that M. Brieslak[h] has seen muriate of soda effloresceing from volcanic tufas, in situations very distant from the sea, and that it abounds in such quantities in the crater, and in the lava streams of Vesuvius, according to M. Menard de la Groye[i], that the peasants load themselves with it for their domestic purposes[k]. The yellow tufa close to the sea, was merely sprinkled with saline particles, like a fine powder, evidently deposited by the spray.

Sailing from Funchal along the eastern coast to the Brazen Head, we first find the basalt (frequently rudely columnar above, and bellying out like the sails of a ship) above the tufa and scoriæ.

[g] They both belong to the sub-genus *helicella* (*Gr. aplostomæ*) of De Ferussac, but I suspect they are new species.

[h] *Introduction à la Geologie*, p. 426.

[i] D'Aubuisson, *Traité de Geognosie*, t. 2, p. 595.

[k] Baron de Humboldt found salt disseminated in a clay formation in the Cordillieres, nearly 13,000 feet above the sea. *Relation Historique*, l. 2, c. 5.

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Beyond the fort and village are one or two alternations of the basalt and red tufa, the former being uppermost; and this leads to the lofty cliffs composed of a basalt with horizontal fractures, which sometimes appears, from decomposition, to be imbedded in red earth, and is covered by shallow, cork-like layers of tufa. All these cliffs have no doubt been produced by the combined attacks of the ocean and atmosphere. The deeply inclined planes, naturally created by volcanic streams flowing from a central and elevated crater to the sea, were first worn away by its waters at their base; shallow vertical depths being formed in the first instance, the sea continued to undermine, whilst the atmosphere decomposed, and the crumbling summits of these cliffs being, from the continued action of the sea below, gradually brought to overhang the base, *avalanches* ensued, which increased their face or depth. Close to the Cabo Garajao, the basalt descends considerably, and the deposit of tufas above it becomes very deep. East of the Brazen Head, there are several basalt dikes descending through the tufa, some of which have evidently been formed before the slips; and the basalt in some places presents a series of concentric circles, as if it had formed a small whirlpool when in the fluid state. It seems very evident, that these dikes are in no instance injections of basalt from beneath, but have been formed by streams filling up those cracks and gaps in the tufa, created by the convulsions preceding an eruption, and by the slips resulting from the partial giving way of former deposits. In descending from Pico Ruivo, I saw two dikes (5000 feet above the sea) uniting above, like the prongs of a pitch-fork, which it would be difficult to explain, but as a downward stream. The tufa, in the vicinity of these dikes, is naturally harder and firmer than that to the westward. We next pass Santa Cruz, which lies in a fine break, uninvaded by the streams of the upper basalt, with Pico Camacha, a little to the west of its bed, Pico Moraynya, (beautifully wooded)

and Pico de Neve, (whose bare summit towers above the others) immediately behind it. As we sail past the cliffs and rocks which follow, we shudder at the sight of the peasantry, crawling down to cultivate a niche scarcely accessible, and on the very brink of eternity; whilst the fishermen let themselves down by ropes to some favourite point, regardless of the rude crosses, which, erected on the lofty crags, record the sad fate of many who have preceded them. Approaching Machico, the basalt becomes of a deeper, duller red, loses all traces of columnar form, is full of horizontal fissures, and presents vast caverns near the sea, sometimes divided by rude shafts, and sometimes blocked up by huge fragments, recalling the cave of Cacus. Of all formations, the basaltic presents the most sublime scenery, and suggests the grandest natural catastrophes to the poet: we cannot wonder at the pleasing gloom of Ossian, when we recollect, that he sung amongst its vast columnar caves, and frowning peaks. The bay of Machico seems to have been formed by a great slip of the eastern cliffs, and is so inviting, that it is not surprising, that our countryman Machim should have directed his shattered bark to its shelter, rather than explore any further.

> "With longing eyes observing to survey
> Some smooth ascent, or safe sequestered bay.
> Between the parting rocks at length he spied
> A falling stream with gentle waters glide,
> Where to the seas the shelving shore declined,
> And formed a bay, impervious to the wind."

The fragments of basalt washed down by the river, or torrent, of Machico, abound in olivine (sometimes presenting the regular crystallization of chrysolite), pyrites, and lime; the latter, generally botryoidal, and lining small cells.

My last excursion was to the Lagoa, or *The Crater*, as it has been called by some, about eleven miles to the eastward of Funchal.

It is within a mere hillock, of an imperfect, conical form, on a plain 2406 feet above the sea, from which it is only three miles distant on the south east, it is about ten miles distant from the east, and thirty from the west end of the island, and has peaks or mountains in its rear, rising from 2000 to 3600 feet above it. These mountains being composed of ridges or streams of basalt, of the same nature as that at the water side, alternating with tufa and scoriæ, and intersected by descending dikes, even at a height of 5000 feet, no one can conceive them to have been masses lifted up from the sea, at the foot of which a crater afterwards opened, as in the formation of Sabrina. The interior form of the Lagoa is certainly in its favour, but there is no wall, or even fragment of a wall, nor, indeed, is there an atom of lava, pumice, or obsidian to be picked up in its neighbourhood. There is not a single ridge or stream of basalt to be traced from it, nor is there a single bed of scoriæ, both of which would have remained in evidence, however long the crater may have ceased to vomit them; the remoteness of which period makes the absence of all traces of sulphur still more extraordinary: in short, the mineralogist would quit it totally disappointed. Its size, which every observation on record would require to be the more considerable, from its very low position, is truly diminutive, the greater axe of the ellipse (bearing E. 30°, S.) being only about 240 feet, the lesser (bearing S. 38°, W.) only 190 feet, and the depth only fifty-four feet. There was a small pool of rain water in it about a foot deep, and the whole surface was covered with a deep bed of vegetable earth, which, from the evidence of that in the neighbourhood, probably reposes on tufa[1].

[1] The length of Madeira, from Porta de Pargo to Porta St. Lorenzo, is 9¾ P. leagues (32½ G. miles), according to the survey of Col. Paulo d'Almeida, being 6 G. miles less than the distance between the same points in *Johnston's Geo-hydrographic Survey of Madeira*, published by Faden in 1790: the greatest breadth is from Porta da Cruz

As I returned, I could not but remark the beautiful hedges of rosemary and naturalized pelargonia, even at a height of 2000 feet above the sea.

Having no more facts to offer on the Geology of Madeira, I will venture to submit some concluding remarks. The probability, that Madeira and Porto Santo, from their vicinity to the Canaries, belong to the same system of formation, leads us to suspect, even before we have examined them, that they cannot have been *created* by a marine volcano[m]. One thing is clear at first sight, *viz.*, that the masses of basalt have not pre-existed as rock of a different nature, and were afterwards heated *in situ*, and penetrated by vapours: every appearance indicates, that these masses have been elevated as fluid, and streamed from the mouth of a crater. It next occurs to us, that had the island of Madeira been entirely created by a marine volcano, its base, if not its bulk, would, probably, (arguing from analogy) be composed of pumice and cinders; both of which are found in comparatively small quantities, and alternating with basalt and tufa. The discovery of the vast bed of transition limestone below the basalt, and continuing to a depth of 700 feet, until its approach to the level of the sea allows us to trace it no further, confirms our conclusion, and seems to demonstrate, that Madeira pre-existed as a mass of transition, or probably of primitive and transition rocks, afterwards rent by a marine volcano, which covered and elevated the island by successive streams and ejections of basalt and tufa.[n]

to Porta S. Jorge, 12 G. miles, according to Almeida, and 12½ according to Johnston. I make the circumference by Johnston's map, about 96 G. miles.

[m] Although M. Broussonet's assertion, that the island of Gomera contains a mass of granite and mica-slate, remains unconfirmed, yet M. Escolar has since found a block of primitive sienite in Fortaventura, and Baron Von Buch has found another primitive rock in Palma.—*Humboldt's Relation Historique*, Supplement, p. 640.

[n] Had the basalt and tufa of Madeira been formed, or deposited, beneath the sur-

I have before remarked, that the ridges of basalt diverge from the more central heights behind Funchal, descend boldly to the sea like the gigantic buttresses of some vast interior mountain, and so distinctly indicate the courses of those igneous streams which enveloped the island, that they would almost seem to have been arrested and indurated as they flowed, as an evidence to future ages. The hills and vallies which existed in the primitive island, at the time of the basalt first breaking through, and flowing over it, and the frequent slips of the first deposits of tufa under the superincumbent weight of basalt, must have contributed still more, than the long continued action of torrents, to its present appearance, and to the unequal depths of the strata. The variation in the sections and aspect of the island, seem to me, to be explained by the considerations, that there has been evidently more than one eruption (from the different alternations and varieties of the basalt, tufa and scoriæ); and that, in the second, streams of basalt must in some places have pursued, from the very mouth of the crater, and in others have been diverted into, a different course or direction to that of the former streams, which must occasionally have presented themselves as obstacles or barriers°. The same reasoning, confirmed by similar evidence,

face of the ocean, and afterwards lifted up, instead of forcing itself through, and flowing over a pre-existing formation, we should not, I conceive, find such a striking continuity in the basaltic coulies and ridges; we should be unable to trace them to that central point in the interior of the island from which they have evidently proceeded; and the different beds of tufa near the sea, instead of presenting such a regular appearance, and such a continued horizontal drift line, (Plate 3, A.) would be generally distorted and confused. Some more recent formation (perhaps a fossil limestone) would probably be found immediately beneath the basalt at St. Vicente, instead of the regular bed of transition limestone.

° It appears to me, that the only alternative to this more probable and simple conclusion, is, to infer, from finding the tufa intersected by the dikes laying above the compact basalt in the highest parts of the interior of the island, that wherever the

is applicable to the shallow, ribanded beds of tufa by the water side, which are not likely to have been washed down (by the excessive rains or inundations which generally accompany volcanic eruptions), and deposited precisely in the same quantity or direction, at different eruptions, and under circumstances differing in some, if in no great degree[p]. The deep beds of tufa in the interior seem to have been deposited confusedly, just as they were vomited from the crater; for I cannot reconcile myself to the opinion, that such vast masses can have resulted from the premature decomposition of the scoriæ, which still remain perfect, and in distinct layers; although this tufa may perhaps have been vomited as detached matter, afterwards agglutinated by rains and torrents.

The next question is, are there any remains of the grand crater, and where was it situated? To the former part of the question I would answer, no; and to the latter, (recalling the directions of the various streams and ridges of basalt, and their narrowness and greater depth in that neighbourhood, from which they all appear to have taken their departure) between the peaks of Ruivo,

former is found to compose the cliffs by the sea side, the latter (and the various strata we have described beneath it) must have given way, and sunk beneath the bosom of the ocean.

[p] That there was a considerable interval between the last, and the preceding eruption, the streams from both of which must have destroyed all vegetation in their course, seems evident, from the uppermost beds of tufa being found to contain fragments of wood in different parts of the interior of the island. Of the wood found in the tufa (200 feet above the sea) near Canical, I merely saw a specimen for a moment, and that in the hand of another person, but it appeared to me to have passed into woodstone (holzstein, W.). In another specimen brought from the neighbourhood of the ice house, (upwards of 4000 feet above the sea,) and which will be found amongst those sent to the Geological Society, the wood, thickly imbedded in an indurated, compact, red tufa, is still soft, and comparatively unaltered: it has evidently belonged to full grown trees, and in its porous nature, and the distance of its fibres, seems to me to resemble that of the *dracæna* more than any other.

Grande, and Canarios. That the plateau of the Poul was also another point of eruption, I have no doubt, for the same reasons; but I have already submitted why there has, probably, never been anything like a crater there. Some have considered the bay of Funchal to be the segment of a large crater[q], but the rocks of the bay do not afford more evidence of calcination than those of the interior; they are not at all vitreous, or approaching the nature of obsidian, and instead of rising in lofty masses above the level of the water, as if they had formed the walls of a crater, they occur in basaltic strata of inconsiderable depth, alternating with tufa, and with the most evident indications of having flowed from the heights in the centre and interior of the island, which are from 3500 to 6000 feet higher than this pretended crater. When we recollect how fragile, how easily decomposed and dispersed, all the parts of a crater (constantly attacked by gases and vapours) are, compared with the streams which issue from it; that nearly one quarter of the cone of Vesuvius fell in a single eruption, and that during a repose of less than a century and a half, it became covered with trees and plants—we cannot wonder that all traces of the grand crater of Madeira should have been effaced in the many ages which have elapsed since its creation: the very convulsions which have so evidently rent the Courals may have undermined its tottering remains. The basaltic rocks of Madeira are probably of the same age as those of Teneriffe, and, consequently, considerably older than the lavas produced by existing causes in the latter island; causes which from local circumstances have not extended to Madeira.[r]

[q] M. Guillin, in the Appendix of Bory St. Vincent's Voyage. See note to p. 25, supra.

[r] Shocks of earthquakes were felt in Madeira in 1813-14, from the N.W.; and January 11th, 1816. The latter is said to have lasted from fifteen to twenty minutes, and to have cracked the beams of the houses, throwing the inhabitants against the walls; it was felt at Lisbon and the Azores.

CHAPTER III.

Visit to Porto Santo.—Story of Machim.—Sharks.—Insects.—Morgados.—History of Baker.—Landing at Porto Santo.—Governor's house.—Governor and family.—Formation of Porto Santo.—Baxo.—Productions of Porto Santo.

I AVAILED myself of an excellent opportunity of visiting Porto Santo; to have hired a boat expressly would have been out of the question, although I should not have hesitated a moment to have done so, under different circumstances. A Genoese who had established himself as a baker at Funchal, having previously lived as cook in the Consul's family, freighted a boat to Porto Santo with flour, salt-fish, and pickled beef, with which he was going to open the the first shop that had ever been seen in Porto Santo; a memorable event, or rather epoch, as he considered it, in the history of that island. This man having once visited Morocco in the suite of a Swedish Consul, and speaking Arabic, professed a kindred feeling for me as an African traveller, and generously offered me a free passage to Porto Santo. Our first effort was unfortunate; we quitted Funchal at midnight, and from the tempestuous weather, were glad to put into Machico the next evening.

I hastened to visit the church, raised in commemoration of the

adventure of the unfortunate Machim; and as one or two Portuguese scribblers have lately thought it worth their while to contradict this historical fact, by mere affirmation instead of reasoning, (to advance their pretensions to patriotism, by pushing their antipathy to the English to the utmost) it may be as well to observe, that the name of the town still records that of Machim; that the altar-piece of the church (in which the remains of the cedar cross are still preserved and shewn) is avowedly raised "in memoria Machim"; that the latter part of the adventure is the subject of a curious old oil painting in the Government-house at Funchal, and that the story has not only been recorded in the first instance by the ancient Spanish and Portuguese writers[s], but

[s] The story is thus related by Alcaforado: In the reign of Edward III, Robert Machim, an accomplished gentleman of the second degree of nobility, loved, and was beloved, by the beautiful Anna d'Arfet, the daughter of a noble of the first class. Machim was incarcerated for his presumption, by virtue of a royal warrant, and on his release, endured the bitter mortification of learning, that Anna had been forcibly married to a noble, who carried her to his castle, near Bristol. A friend of Machim's had the address to introduce himself into the family, and became the groom of the broken-hearted Anna, who was thus persuaded and enabled to escape on board a vessel with her lover, in the view of ending her days with him in France. In their hurry and alarm they embarked without the pilot, and the season of the year being the most unfavourable, were soon at the mercy of a dreadful storm. The desired port was missed during the night, and the vessel driven out to sea. After twelve days of suffering, they discovered faint traces of land in the horizon, and succeeded in making the spot still called Machico. The exhausted Anna was conveyed on shore; and Machim had spent three days in exploring the neighbourood with his friends, when the vessel, which they had left in charge of the mariners, broke from her moorings in a storm, and was wrecked on the coast of Morocco, where the crew were made slaves: Anna became dumb with sorrow, and expired three days after. Machim survived her but five days, enjoining his companions to bury him in the same grave, under the venerable cedar, where they had, but a few days before, erected a cross in acknowledgment of their happy deliverance. An inscription composed by Machim was carved on the cross, with the request, that the next christian who might chance to visit the spot would erect a church there. Having performed this last sad duty, the survivors fitted out the boat which they had drawn ashore on their landing,

has been frequently referred to in political arguments by modern ones[t]. The only native poet of Madeira has introduced it in his epic of Zargueida[u], and as the reader has probably never heard of this poem, I will conclude my remarks on its subject, by endeavouring to translate the two first stanzas of the episode.

In far famed England liv'd a noble knight,
A true Adonis in each woman's sight,
Whom nature seemed with every grace to dow'r,
Which love inspires, or o'er the heart has pow'r;
Fierce in the field, and gentle in the bow'r.
'Twas Machim's fate at once to see and love
Proud d'Arfet's daughter, Anna, born to move
Those tender feelings in each gazer's breast,
Which thought may picture, though words ne'er expressed;
Life to the favour'd—death to the unblessed.

Two dead sharks (the *spinax acanthias* and *scymnus licha*) lay

and in the hope of reaching some part of Europe, were also driven on the coast of Morocco, and rejoined their companions, but in slavery. Zargo, during an expedition of discovery to the coast of Africa, took a Spanish vessel with redeemed captives, amongst whom was an experienced pilot of the name of Morales, who entered into the service of Zargo, and gave him an account of the adventures of Machim, as communicated to him by the English captives, and of the land-marks and situation of the newly-discovered island. Galvano relates the same story from the Castilian Chronicles, with the difference, that Machim survived and reached Castile, after being made a prisoner by the Moors.

[t] "He porque elle descende de Joáo Gonçalves Zargo? Pois será possivel que, vindo este á custa do Estado a tomar posse de huma Ilha, já por outros achada, e deserta . . . . . elles só erao *Nossos Senhores* para mandarem receber o que ganhou Zargo por vir descubrir sem custo huma Ilha já descoberta, e lançar lhe fogo. . . . . Tanta dinheirama para o Marquês de Castello, Melhor, em remune raçao dos serviços de Zargo!!! Oh Meu Deos! e ainda estara por pagar á sua vinda a esta terra, quia do pelos companheiros do miserando Machim, que aqui foi sepultado antes daquella verida?" *O Patriota Funchalese, No.* 166. Vol. III.

[u] *Zargueida, Descobrimento da Ilha da Madeira*, por Francisco de Paula Medina e Vasconcellos. Lisboa, 1806.

S. Bowdich del et lith.

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on the beach; I looked carefully under the fins for parasitical crabs, but found none: the *squalus zygæna* is common, and eaten. Only five indigenous plants appeared to characterize the vegetation of the immediate environs; the *verbena officinalis*, *oxalis luteola*, *bidens radiata*, *calendula officinalis*, and *solanum pubescens*; the leaves of the latter are applied to cuts by the peasantry. To these may be added the *datura metel* (introduced and naturalized), the *tropæolum majus* and *raphanus sativus*, which have probably strayed from the gardens. There being nothing better to engage my attention, I commenced a hunt after insects, but having no net, I caught but few; among them, were what appeared to me to be a new species of *locusta* and *gryllus*, fig. 21, if not of *agrion* and *iulus*. Specific descriptions of the 46,000 insects already known, (to say nothing of the 4000 birds) could not be very conveniently comprised in the library of an African traveller. But those I found are all drawn, and may be referred to by the Entomologist. The bee of Madeira is evidently a different species to that of Europe, and seems to be the link between it and the Senegal bee, imperfectly described in a memoir of Latreilles, from a specimen brought home by Adanson, but in too bad a state to be figured[x]. One of the spiders may be a new species of *mygale*; but the most curious I met with, is an *arachne*[y], which does not spin any web, but retires into a small round hole with its prey; it apparently fascinates the fly, then jumps upon it, remains sucking it for some time, and at length carries it away.

[x] Colour black; head, body, and legs, nearly covered with light yellowish brown hairs, forming stripes of that colour between each band and division of the body.

[y] Fig. 24, body brown; head black, with a white speck; eyes set all round the head; a few scattered hairs on the head and legs. Also an arachne of a pale bright green, fig. 23, the last joint of each claw, pale brown; eyes set in the form of a crescent; an oblong semicircle of dark brown on the back; and four little spots of the same colour.

A number of what I imagined to be decayed gentry, whose daily routine seemed to be to do nothing all the morning, and to rest themselves in the evening, were lounging before the principal church, or along the torrent wall, in rusty black coats and washed-out nankeens, set off by a large cane. These I was told were Morgados or Proprietors, to whom industry of any kind would be a stain, and who can only condescend to superintend their own properties, that is, to watch how many eggs the hens of their hard-working tenants lay, in order that they may exact the rigorous half of every thing produced, not only *by*, but *upon* their estates. I called upon one of these grandees a little after eight o'clock in the morning, to inquire about a chalybeate spring which was described to be in his ground, and such a scene I never before witnessed. The house seemed as if it would fall about our ears every moment, many of the stairs were broken in, and there was no door to the chamber in which I discovered the taper figure of the proprietor, floating about in a ragged dressing gown, whilst his lady (a huge deformed woman, her yellow visage begrimed with dirt, her neck uncovered, and her wiry black hair likening her to a Medusa), was attempting to draw her unwholesome fingers, instead of a comb (occasionally using her nails), through the thick, matted, uncut locks of four squalid, unwashed, and almost naked children; who slipped away to take another roll on one of the two filthy mattresses, which still lay on the rat-eaten floor of this family sty. A pen and ink, and a few papers in the window-seat, gave my friend the Genoese occasion to whisper, that this Morgado gained a few pistrines occasionally as a lawyer; be that as it may, he almost overwhelmed me with his sweeping bows, which I was compelled to return with a liberal discount, and stiff circumspection, lest I should slip a leg through one of the gaps, which threatened me with a sort of infernal region below. What a delight it was to breathe the fresh air again, and to sit down to

our breakfast in the well-swept cabin of our boat-master, who waited on us in a snow-white shirt and trowsers, and directed my attention, as if by way of antidote, to the clean, pretty little peasant girls who were offering chestnuts at the door. If the unfortunate man we had just visited, thought I, were wise, he might make himself rich and respectable at once, by descending, or rather raising himself to that class which Providence has made superior in this island, although man may call it otherwise, and by cultivating his own vineyard, half the profits of which, less the tax to the crown, support with some degree of comfort, a labourious family, perhaps larger than his own, which lingers through a bare existence, in filth and wretchedness, on the remainder. But, probably, this poor man could not, even if he would, take his property into his own hands. The law which permitted the proprietor to enjoy, not only half the profits of the labours of the tenant, but half of every thing that springs up, or is reared about his cabin, warranted the latter to take advantage of every means of protecting himself against the non-renewal of a lease, from caprice or any more interested feeling, which might dispossess him of what his own exertions had improved, perhaps created. He was enjoined to build walls to keep up the soil, spread over declivities, and to defend it from the torrent; which walls he was to be paid for at the valuation of any other tenant, sworn by the camera, when compelled to quit the property. Stone abounded*, and he devoted the leisure of particular seasons, to multiplying these loose walls as much as possible, whether useful or not. The quarrels with the proprietor, and all these accumulated walls, are estimated, not only far above their value in point of usefulness, but far above the value of the labour and materials expended. The proprietor,

* To split the compact basalt, they make a strong fire on the mass, and then throw water on it. These rude walls are valued at from six to ten dollars the brassa (about 7 feet 3½ inches); torrent, or river walls at forty.

unwilling, or more frequently unable, to pay such a sum, allows the tenant to remain, and never thinks of disturbing him again. It is generally thought, that $\frac{3}{5}$ of the profits of the estate would be a fair proportion for the tenant to enjoy, but surely a fixed rent would be best for both parties.

There being no appearance of a change of weather, we returned the next day in a small boat to Funchal, and two days after, again repaired to Machico, to join the cargo, which had been left under the care of the baker's brother-in-law, who was to be the acting partner in the projected commercial establishment at Porto Santo. We sailed from Machico at four o'clock the next morning, and were out all that day and the following night. My friend, the Genoese, diverted the tiresomeness of our tempestuous voyage with anecdotes of his life; not liking the family trade, that of a butcher, he quitted Genoa when young, and opened an earthenware shop at Marseilles, where he made money enough to freight a small vessel to Gibraltar. In this he was wrecked near Minorca, where he consoled himself by marriage. In a few years, the world smiled on him again, and he was growing rich on the profits of a *Cabaret*, but his itching to become a merchant, and to adventure on the seas, ruined him a second time; his schooner was taken by the French, and he was compelled to enlist in their army, then in Spain, in order to regain his liberty, by deserting at the first convenient opportunity. He then visited Morocco with a Swedish Consul, and told marvellous stories of the outrages and excesses committed with impunity by the "mad saints," who rushed into the houses and bit off the ears, and other delicate morsels of young children, whenever an over-nicety in their appetite prompted them. He was afterwards a short time at Janina, which he insisted was in a country called "true Barbary," (nor could I succeed either in undeceiving or understanding him) adding, that although Ali Pacha was a "second Buonaparte," yet for his part

he never travelled so safely with property in any country. He then became cook to some officers at Gibraltar, failed in an adventure to Madeira, and lived in the service of the British Consul, until the profits of a baker's shop managed by his wife, and a manufactory of vermicelli and maccaroni, started by himself, (the machinery for which he had imported from Genoa) set him on his legs once more.

The white sandy beach of Porto Santo* seemed to promise me a different geological field for observation to that of Madeira, and I was all impatience to get ashore, but it was necessary that I should have the Governor's permission to do so, which the captain of the boat was despatched to procure; for the economical nature of the government did not permit any Mercury to be in attendance for this purpose; and, indeed, during the three days I resided there, I could never discover that the governor had more than one king's servant under his command, for all the purposes of ordinary state, and he (distinguished by being clothed in tattered remnants of various uniforms) opened the gates, hoisted the flag, beat the drum at sunrise and sunset, swept the yard, helped in the kitchen, and waited at table when the governor had company. I should mention, that the governor himself, a major in the army, has only 600 dollars a year from the government, depending for any thing more on his own ingenuity. The captain of the boat tied his better suit of clothes in a handkerchief, which he held on the top of his head, and plunging into the water, swam ashore; but although he quitted us at seven o'clock, it was thought derogatory by the governor's servant to acknowledge that his Excellency had risen until nine, and then he must breakfast

* Porto Santo was discovered in 1418, by Joao Gonsalves Zarco and Tristao Vaz, when driven out to sea by a tempest, in attempting to pass Cape Bojador, and Madeira by the same persons, but not until three years after, according to Cadamosto. *Colleçao de Noticias*, p. 8.

before he could grant the audience; in which he graciously permitted us to come ashore, in a place where there seemed nobody but himself and the drummer to prevent us. The landing is almost as bad as that at Funchal. I begged to wash myself before I proceeded to the governor's, and was bowed into a stable, and furnished with a decanter of water, not as the most convenient, but as the most splendid vessel that could be immediately laid hold of in the neighbourhood. The governor's house looked like that of the lawyer in a small village in England; it was very neat, of one story, and contained but two sitting rooms, one of which, however, was spacious, and very comfortably furnished. A row of cannons (some of which had fallen from their carriages, whilst the others, from their monstrous touch-holes and rusty condition, were emblems of peace rather than war, and fit subjects for a society of antiquaries) adorned the turf before the house, and a second row, in sufficiently good condition for the gunner or drummer to fire a salute with some safety, was ranged in the yard. We were given to understand, that we should find the Governor in his library, which proved to be a small room level with the court, adorned with about a dozen books, the drum, some old maps of Sanson and Jansens, (more useful for giving an idea of the history, than of the actual state of geography) and some rude drawings of his son's, a genteel, smart boy, about thirteen years of age. His Excellency was hard at work in a cotton jacket, writing despatches to Madeira; the unexpected appearance of our boat having flattered him with the rare opportunity of communicating the unchangeable state of things in Porto Santo to his superior. He received me with the greatest politeness, and begged me to believe, that both he and his house were at my service, and sending for the Commandant (an old man of seventy, distinguished by a red edging to his great coat) charged him to order one of the most intelligent of the better class of peasantry, on his allegiance,

as a militia-man, to accompany, and direct me, in my rambles through the island.

The lowest visible deposit in the island of Porto Santo, is a calcareous tufa, of a greenish-grey colour, which extends, in the north-eastern parts of the island, to a height of 1600 feet, and is ribbed throughout with numerous vertical dikes, of a reddish-brown basalt. The middle of the island affords a plain, or rather a shallow basin of sandstone, on a level with the sea on the south side, where it covers the beach with a siliceous sand, which, as we walk to the eastward, gradually becomes mingled with the black ferruginous sand resulting from the decomposition of the tufa. Following this plain in its greatest length, that is, from the beach on the south side, to the Fonte Araya, which is immediately above the beach on the north side, (a distance of 2¼ miles, and forming the breadth of the middle part of the island) we find ourselves on a sloping cliff, 418 feet above the sea. We may descend this cliff with ease for 134 feet, where the sandstone terminates, being superposed on the tufa, which is here 284 feet deep, (that is, from its junction with the sandstone, to the surface of the waters which hide it) and is still intersected by basaltic dikes, which have evidently descended through it, from the highest peaks of the interior of the island.

The lowest bed of this sandstone (which may be best examined in the excavations near the southern beach, being hidden by sand and *debris* at Araya) is hard and solid, and is used as a building-stone. It is of a reddish buff-colour, of a slaty structure, with indurated veins, effervesces pretty vigorously, and presents small black spots, apparently ferruginous. This gradually passes into a looser sandstone (best seen at Araya), of a lighter buff colour within, acquiring a blackened scoriaceous appearance on its outer surface, and of a less stratified appearance, whilst the still looser sandstone above it, presents horizontal bands in the vicinity of

that just described; then a considerable vertical depth with oblique lines, like lines of cleavage, on its surface; where it became harder, covering the cliff with a ragged outline of large indurated flakes, shooting upwards. I made two sketches, the one when half way down the cliff, the other when on the summit, with my face turned inland, so as to take in the three peaks, Plate 7, A, which are composed of the same tufa, intersected by dikes, which appears between the sandstone and the sea in the other drawing, Plate 7, B[b], the sandstone having been deposited on it, only in the lower part of the island, which happens to be the middle. The looser sandstone immediately below the flaky, and which yielded to the fingers, contained, in its upper and outer surface, an *ampullina*, (or *marine ampullaria*) a large *helix* resembling the *h. plicata*, fig. 17[c], but differing, from the plate being on the last whorl, which does not advance as far into the mouth; a still larger, wholly unknown to me, fig. 16, and two others, the one, a *helicella* of De Ferussac's *groupe, marginatæ*, the other, a *helicigona* of the *groupe, vortices*[d]. I found none of these shells, which were notoriously in a fossil state, deep within the mass, although it does not follow that they are not to be found there; but some of the upper masses of this loose sandstone on the plain, seemed almost entirely composed, throughout, of a small *bulimus*, fig. 15, two species of *helicella*, fig. 13 and 14, each belonging to De Ferussac's *groupe, aplostomæ*, the one perfectly smooth, and the other striated longitudinally. All these shells were quite white. I found no *ampullinæ* amongst the shells of the beach, no *bulimi*

[b] It is of a greenish-grey colour, with orange-red ferruginous spots; it becomes harder upwards, and its specific gravity is 1.95.

[c] Since named *h. subplicata*. *Sowerby*.—Ed.

[d] In examining the beds of sandstone at the northern extremity of the Punta Araya, near Cumana, frequently bathed by the sea, Baron de Humboldt observed univalve shells, resembling the genus *helix*, mixed with marine bivalves. *Voyage*, l. 2, c. 5.

A

Pl. 7.

B

T.E. Howdich del. I. Howdich lithog.

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PORTO . SANTO ,

any where, and the existing *helices* (thickly strewed over the soil formed by the calcareous tufa, and found very sparingly on the fig-trees in the sandy plain), were specifically distinct from the considerably smaller ones, forming entire masses of the loose sandstone; and generically distinct from the enormous species imbedded in its surface[e].

The flaky sandstone frequently formed isolated ledges, or hillocks, of a most picturesque appearance, on the southern part of the plain, numerous flakes being regularly piled on each other, shooting upwards from the soil in angles of 45°, and seeming to emulate the lofty peaks of tufa behind them, Plate 7, A[f]. Imbedded in these hillocks are numerous, close-grained, indurated, cornuform, hollow masses, with smaller lateral branches, which I conceive to have been formed by the sand having enveloped plants or fragments of wood, subsequently and entirely decomposed. These sands have evidently been thrown up by the sea, on the low southern coast of the island (almost on a level with it), and have been gradually advanced, and propelled inland, and afterwards more or less agglutinated, until they have reached the northern side, enveloping the vegetation, and entombing the

[e] The recent shells which I found on the beach of Porto Santo, were a *cypræa*, a *cassidaria*, of an orange-colour; three species of *colombella*, a *trochus* of a dusky ground, and spotted with a dull red; three *pectines*, one spotted with red, another brown, streaked with white and rose-colour, and the shell remarkably thick in texture; (probably a variety of the *p. flexuosus*) and fig. 20, of a pale colour, mammillated and shaded with light green; four species of *venus*, one white with brown streaks, and a rose-coloured *apex*, fig. 19, a second of a pale flesh-colour, and another of the same colour, but nearly transparent, also one of a flesh-colour with rich brown streaks; fig. 18, the *cardium edule*, a small *haliotis*, of a deep red, with green and orange streaks; perhaps a variety of *h. tuberculosa*, and a rose-coloured *echinus*, streaked with purple, and with a brown spot at the insertion of each spine.

[f] According to M. Beudant, the basaltic tufas of Tihany are covered by a sandstone resembling the *silex molaire* of the Environs of Paris.

different races of terrestial molluscæ which inhabited the soil. For the soil must then have been formed of that calcareous tufa which we now find beneath the sandstone, and on which the living *helices* are still scattered in prodigious quantities, whilst they are not to be met with on the sandy soil[g]. Perhaps the system of winds for this part of the Atlantic has been modified in the course of ages[h], and the south may have prevailed more frequently formerly, when the outlines, if not the number, of the continents and islands in this sea were different.

I took a boat and went to the small island of Baxo, one mile and a half in its length, (which bears about N.N.E. and S.S.W.) and half a mile in its greatest breadth. It is only half a mile distant from the south-west end of Porto Santo (entirely composed of cliffs of tufa with six dikes), from which it has been evidently separated. Half this intervening space of water is occupied by a bank, and there are only five fathoms in the deepest part of the narrow channel, which is also obstructed by rocks. To get at all the strata in succession, I was obliged to climb up an almost perpendicular height of about 220 feet, on my hands and knees; not daring once to look behind me, and frequently shoved and dragged up by my guide, who conducted me down by a com-

[g] M. Bremontier, who has examined and studied sandy deposits of this nature (*dunes*) very thoroughly, estimates their progress at sixty feet in the year, in some parts, and seventy-two in others. In 2000 years they will arrive at, and cover Bordeaux, (as they have, already, several villages of the Gulf of Gascony) according to his calculation; and, from their present extent, rather more than 4000 years must have elapsed since their formation commenced. Cuvier, *Discours sur la Théorie de la Terre*, p. 76.

[h] The evidences of a change of climate having taken place in the northern temperate zone, are numerous: (See Bowdich's *Elements of Conchology*, Introduction, p. viii.) and the influence of differences of climate on prevailing winds has been admirably investigated by de Humboldt. *De l'Influence de la Déclinaison du soleil sur le Commencement des Pluies Equatoriales.* Annales de Chimie, 1821, p. 179.

paratively safe descent from the south-western end, but where many of the strata were covered by debris. We first ascended about 100 feet of the same tufa which I have described at Porto Santo; then twelve feet of limestone, of a granular sandy structure, glimmering lustre, and emitting an *alliaceous* odour when struck; it contained no fossils, or at least none that I could discover, after examining and breaking away its surface in various directions, and after splitting numerous large fragments[1]; it is of a buff ground, sprinkled with grey and red spots, or grains. Above this, I found about fifty feet of a conglomerate of nodules of basalt, or rather of wakke (from its colour, fracture, and specific gravity); these nodules were very large below, but diminished in size upwards, until they looked like rusty nail-heads, inserted in a ground of a ferruginous sandy earth, not effervescing, of a brick and dull orange red, and yielding to the nail: this earth was covered with connected lines (spread like a net-work) of mamillated carbonate of lime, pervading the whole mass, sometimes lining small cavities, and of a dull white passing into grey. We then climbed over from eight to ten feet of a conglomerate limestone, generally of a chalky white, soiling the fingers, sometimes of a whitish blue, and containing large nodules of wakke, and imbedded masses of a granular sandy limestone, resembling that before described, but with more grey, and less red in its composition; the additional grey appearing to have been supplied by very small fragments of basalt. The white part of this limestone presented immense masses of Lamarck's *cateniporæ* (*tubipora catenulata* Lin. Gm.), and with much difficulty I chiselled out (for like that below, it was excessively hard) some perfect moulds of a large *cardium*; and the *cardium edule*; one

[1] The fetid limestone, submitted to an excess of muriatic acid, affords a residue of nearly .49 of silex; the white limestone leaves scarcely any, and its specific gravity 24, is 1 less than that of the fetid.

end of the *Mytilus lithophagus*, of a *solen*, moulds of various-sized *venuses*; a *voluta*; a *turritella*; a *conus*, like that at Lisbon, the *pecten multiradiatus*, and the *pecten glaber*, (neither of which species, I believe, have before been found in a fossil state) and the fragment of a large white *pecten*, apparently the *p. maximus*. Some of the *cardia* were imbedded with the valves thrown open, and presented ridges like the ligaments, and even the orange colour of several of the *pectines* was preserved, and there were several impressions like *arcæ*[k]. This limestone afforded no odour when struck. I found a beautiful fossil nearer the beach, which appears to me to be an *echinanthus*[l], perhaps it had fallen from above, with some of the fragments of this limestone, which, with the other, supplies the kilns of Funchal. Above this shelly limestone was about six feet of a fine-grained, indurated sandstone, deposited in layers, with projecting ledges, and acquiring a scoriaceous appearance, and dark-grey colour on the outer surface, from exposure to the atmosphere, but presenting an orange-brown within, and effervescing. On this rested a conglomerate, about fifty feet deep, of nodules of wakke, of a lesser portion of the orange-coloured ferruginous sand, and of small fragments of wakke, emerging like nail-heads, and coated (with the exception of the upper surface) with an indurated grey clay; which also lines small cavities in a mammillated form. No part of this conglomerate effervesced, but it was covered by a shallow horizontal bed of sandstone, of the same nature as that above the fetid limestone.

Through all these different horizontal masses, (that is, from the

[k] The *solenes*, *cardia*, and *pectines*, may be said, from their greater abundance, to characterize this rock. The calcareous brecciæ of Araya, near Cumana, contain *solenes*, *pectines*, and *ampullariæ*, (Humboldt, *Relation Historique*, l. 2, c. 5); the latter are only found in the sandstone at Porto Santo.

[l] An affinis, *e. cucurbites?*

summit of the table land, of which this island is principally formed, to the sea, a depth of about 240 feet) descend, more or less perpendicularly, numerous basaltic dikes, sometimes jutting out like walls, and serving as rude stairs in the ascent, at others, nearly even with the surface of the various rocks they intersect, and frequently running parallel with the beach for some distance, at the water's edge, and forming rude piers. In some parts, their surface was covered with considerable patches of a dull coralloidal carbonate of lime, and in the basalt of the dikes on the north side, (for it was the eastward face which afforded me the section I have described) I found beautiful crystals of nepheline. A *composita (flosculosus)* with white decomposed leaves, a ligneous stem, and flowers borne in large close panicles, characterized the whole of this limestone island; the absence of the florets prevented me from determining it; the *involucra* were polyphyllous, and the receptacles covered with silky hairs. Several small masses of the *spongia officinalis* lay on the beach.

The peaks of tufa in the north-eastern part of Porto Santo, are capped with a basalt approaching to phonolite, (which, if I mistake not, has been found to cap the basaltic mountains of Bohemia and other parts of Europe) by its lighter colour, numerous vitreous crystals of felspar, decomposing crystals of common hornblende, and lesser specific gravity, 2.15; but it yielded no particular sound like phonolite, and its lamellar structure deviated in one instance into large pentagonal columns; immediately beneath this capping of lighter basalt, appear the dikes, which descend through the tufa to the sea; the upper parts of these dikes (sometimes elevated 1600 feet above the sea), are generally of an earthy brown, ferruginous appearance, but as they approach the sea, the basalt becomes of a dark grey colour, and in the north-eastern point of the island, especially, near Pico da Cruz, it is studded with large, but imperfect, crystals of basaltic hornblende. In descending by

these dikes to the sea, immediately north of Pico Juliana, (apparently the highest in the island, yet not much exceeding that of Castello) I found a deposit of native alum; and almost on a level with the sea, another of a bright orange ochre[m], accompanied by a ferruginous spring. The tufa would seem to be strongly impregnated with muriate of soda, for all the streams which issue from it, at whatever height, are very brackish, whilst the water from the sandstone is always pure, even when the sources are much nearer the sea than those of the tufa[n]. I saw a large piece of fibrous gypsum at the Governor's, and it was said to be found in abundance in the north-eastern rocks, or islets, of Pescada and Lorenço, and in a third, about two miles from the shore. I should have made a point of visiting these rocks; the rock of Fonte (about a mile from the northern shore), the island of Farol (about half a mile from Fachoda, the W.S.W. point of Porto Santo), which appeared to me to be covered with scoriaceous basalt, overlaying the tufa, and dipping rapidly to the W.S.W., and the island of da Serra about half a mile from Dos Frades, the S.S.E. point of Porto Santo;—but to do this, which would not have occupied two days more, I must have given up the opportunity of returning with the Genoese, and hired a boat at my own expense, to carry me back to Madeira, which was out of the question. I was prevented from examining the Desertas (which have evidently been divided by the strong south-west current that sets against them), by similar considerations.

There are no traces of primitive or secondary formations in

[m] This ochre was evidently formed from the decomposition of the basalt, for on breaking a lump, a nucleus of basalt was found within it. It is a richer pigment than the ochre imported at Madeira from Teneriffe, to paint the doors and wainscots of the houses, in imitation of mahogany.

[n] In this respect, it approaches Baron de Humboldt's *argile muriatifère* of Araya, near Cumana, also found nearly 13,000 feet above the sea, on the Cordillieres of New Grenada. *Relation Historique*, l. 2, c. 5.

Porto Santo; but the calcareous tufa just described, which is a tertiary formation°, seems to form its base, or at all events, is lower than the present level of the sea, in the whole circumference of the island. If we assume, that there are transition, or secondary rocks beneath this tufa, and hidden by the sea, we must also assume, in order to admit the pre-existence of Porto Santo as a secondary formation, like Madeira, that the sea has been at a lower level than it is now, or, that the shock which rent the previous formation to admit of the throwing up of the clayey tufa, also undermined these older rocks, and buried every vestige of the former island beneath the ocean. When we associate the circumstance of the shelly limestone, in the adjacent island of Baxo, being 160 feet above the sea, and about sixty feet above a similar deposit of tufa, it seems to be much more natural to conclude, that both Porto Santo and Baxo were formed beneath the ocean, and afterwards hove up, at a comparatively late period. Viewing Porto Santo apart, it would be more simple to conclude, that the tufa, (which is deposited confusedly, and not in beds) created by a submarine volcano, was added, heap upon heap, and thus became raised above the water; in which case, (recollecting that it is found at a height of 1600 feet above the sea, in the north-eastern parts of the island) we must have admitted, that it continued to flow through some crater or opening, long after the first emerging of the island. But this reasoning is not applicable to the adjacent island, which presents the shelly limestone above the tufa, and which has evidently been separated from Porto Santo. The basalt which caps the peaks, and descends in dikes, not only through the

° Combined with the limestone and sandstone, it seems to resemble the local marney formation described by D'Aubuisson, at the foot of the Pyrenees, more than any other, (*Traité de Géognosie*, vol. II. p. 436); unless it be the *argile muriatifère*, sandstone, and shelly limestone breccias at Araya, near Cumana.—Humboldt, *Relation Historique*, l. 2, c. v.

tufa of Porto Santo, but through the conglomerates, limestones, and tufa of Baxo, is probably coeval with the forcible elevation of these islands; the fissures being created by the convulsions preceding it. One thing, however, seems certain, that the sandstone at Porto Santo, which is not intersected by these dikes, was deposited subsequently to the appearance of the shelly limestone. Whether it was hove up from beneath, as I am much inclined to believe, or whether it became visible above the waters from a depression of the channel of the ocean, I can say nothing in favour of the hypothesis, that the heights of Madeira, Porto Santo and the Canaries, may have formerly made part of a chain of primitive mountains, distinct from, or continuing, the present western extremity of the Atlas. The limestone beneath the basalt at Madeira, is evidently of the same nature and formation as that beneath the basalt at Lisbon. The shelly limestone of Baxo is distinct from that at Almada on the Tagus[p], but it is probably of the same formation as the shelly limestone, mentioned by Baron de Humboldt, as covered by basalt on the coasts of Portugal. Of what formation is the limestone found on the coast of Africa, opposite to Teneriffe? and does that, subordinate to the tufa at Lancerota and Forteventura, resemble either of those at Baxo[q]?

The deposit of the sand stone on the plain of Porto Santo, seems to have been providential, for it has enabled the inhabitants (about 1400) to cultivate the vine, which would not succeed in the calcareous clayey tufa, which yields them good crops of wheat, Indian corn *(zea-mays)*, barley[r], beans, and peas; forming a contrast of cultivated vegetation, particularly striking in a small island,

[p] Vide *supra*.

[q] Humboldt, *Rel. Hist.* l., 1., c. ii., and *Supplement* p. 641. 4to.

[r] The produce of Porto Santo, in 1813, was 695 pipes of wine, 3768 bushels of wheat, and 1628 bushels of barley. The population amounts to 1400, and there are 300 militia. M. Laplace, in Paris, and Mr. Morton Pitt, in a village of Devonshire, found, that the number of men capable of bearing arms, amounted to 4th of the whole

six miles long, and two and a half broad. It was the worst possible moment in the year to look for plants, in which Porto Santo is at all times poor. The *cestrum scandens*, (when clipped, it formed hedges and the stem became very strong) the *disandra africana*, (answering to the specific description of Jussieu, but not to that of Persoon) and the *rosmarinus officinalis*, seemed to be the only plants which then characterized the vegetation of the sandstone soil. In my eastern ramble, I found the *thymus angustifolia*, *fumaria parviflora*, *raphanus raphanistrum*, *erica scoparia*, the *polypodium* already described, and the *calendula officinalis*. Towards the west I met with the *papaver rhœas*[s], *senecio vulgaris*, a grass too far gone to determine, but which I believe to be an *agrostis*, a *verbascum*, the *nepeta calaminta*, *solanum pubescens*, *euphorbia lophogona*, an *acrostichum*, a *mesembryanthemum*, and, on the shore, a *salsola* (an *mollis?*). The *lichen roccella* abounds in the neighbourhood of the eastern cliffs. It is said, however, to be generally inferior to that of the Salvages and Cape Verd Islands: the darker variety, in which the fructification is most abundant, and which is found most inland, is preferred to the lighter-coloured, which is found near the sea[t]. A solitary dragon tree[u] (*dracoena draco*,)

population; and Ghetti, in the fifteenth century, calculating the number of Florentine citizens capable of bearing arms, at 80,000, by computing four persons with each, so as to include infirm people, women and children, estimated the population at 400,000. *Roscoe's Life of Lorenzo de Medici*, vol. I. p. 171.

[s] They also cultivate the *p. somniferum* in small quantities, for the sake of its medicinal qualities.

[t] It may be purchased in Madeira for five dollars the pound, but it is a monopoly, and can only be shipped to Lisbon, and that by one person. The tax on it was formerly considered to be the Queen of Portugal's pin-money. Some say here, that it is used as a scarlet dye, others as a mordant. I thought it produced a lilach dye only, and that very fleeting. It is said to fetch seventy dollars a pound in Genoa: 4600 arrobas, or nearly 68 tons (the Portuguese weights being four per cent. heavier than the English), were shipped from the Cape Verde islands for Lisbon, in 1803.

[u] Sir Humphry Davy has shewn, that the comparative longevity of trees may be

presented itself (with some remarkably tall *cacti*) just above the Fonte dos Anjos, near Pico Fácho. Baron de Humboldt considers the Dracoena Draco as exclusively indigenous to India, and infers, that the Guanches were, or had been, in relation with some Asiatic race[x]. I am inclined to think it is also natural to Porto Santo, and perhaps to Madeira; not of course from the solitary individual now remaining in the former island, (which is not seven feet in circumference) or from the eight or ten larger ones to the north, and to the east of the town of Funchal, but from the subjoined account of Cadamosto[y], who visited Porto Santo in 1445[z]. Cordeyro writes, that the dragon trees of Porto Santo were so large, that fishing boats, capable of containing six or seven men,

pretty nearly estimated by the quantity of charcoal produced by their woods; M. Mirbel doubts if this rule would apply to the *Baobab* and Dragon trees, from the loose texture of the wood (*Elemens de Physiologie végétale*, t. 1, p. 375.) I availed myself of the opportunity of making the experiment, which I did carefully in an earthern retort, stopping the mouth, directly the whole of the gaseous matter had escaped, and breaking it that I might not loose an atom of the charcoal; which was of a light fibrous texture, resembling horse-hair, and amounting only to 0.05 of the weight of the wood which furnished it. Tradition reports, that the dragon tree of Orotava (forty-five feet in circumference) was as large in 1402, as Baron de Humboldt found it in 1799; and the *baobabs* of Senegal (upwards of 100 feet in circumference), are upwards of 5000 years old, if we may trust the calculations of Adanson.

[x] *Tableau de la Nature. Physionomie des Vegetaux*, t. 2. p. 110.

[y] ". . . . . Acha-se tambem nella sangue de Drago, que se cria em algumas, arvores, e he huma goma, que ellas estilão em certo tempo do anno, e se colhe por esta maneira: fazem alguns golpes com hum cutello no pé da arvore, e no anno seguinte em certo tempo, as ditas cortaduras estilaõ a gomma, que cosem, e purificão e assim se faz o Sangue. Esta arvore produz hum certo fruto, que no mez de Março esta maduro, e he muito bom para comer, á semelhança de cerejas, mas amarello." . . . . *Colleção de noticias para a historia e geografia das naçoes ultramarinas que vivem nos dominios Portuguezes, ou lhes são visinhas, publicada pela Academia Real das Sciencias.* Lisboa, 1812. Tom. 2, p. 8.

[z] The Portuguese editors have shewn, in their introduction (p. xii, xiii,) that Cadamosto's voyage to the coast of Africa, took place in this year, instead of 1454, as in the first edition of Cadamosto; or 1501, as in the Latin translation of Grynæus.

were made out of the trunks, and that the inhabitants fattened their pigs on the fruit; but he adds, that so many boats, shields, and corn-measures had been made out of them, that even in his time there was scarcely a dragon tree to be seen in the island[a]. Indeed there are not twenty trees of any kind left standing in the island at present, and the inhabitants are obliged to make fires of dried cow dung, when they cannot afford to import fire wood from Madeira. If the ancients had visited Madeira and Porto Santo, as M. Heeren supposes[b], would they not, probably, have noticed this extraordinary tree, which struck Cadamosto so forcibly?

We shot the *falco oesalon*[c]; the *upupa capensis*, which I presume was not known to inhabit so far north; the *larus canus*, said by the natives to be blown over from the African coast; the *columba livia*, of which there are large flocks; a *turdus*[d]; the *loxia enucleator*, and a larger *corythus*[e].

The temperature of the spring at Araya, (December 13th) was 66° or 42° higher than that of the air, which must be pretty nearly the mean temperature of Porto Santo. On the sandy beach of the south side of the island, the thermometer stood at 67° at half past three P.M., and 60° at sunset.

[a] *Historia Insulana das Ilhas a Portugal Sugeytas no Oceano Occidental*, composta pelo Padre Antonio Cordeyro da Companhia de Jesus. Lisboa, Occidental, 1717.

[b] He considers them to be the Fortunate Islands of Diodorus Siculus. *Afrika*, tom. 1. p. 124.

[c] For its parasitical insect (a *ricinus*,) see fig. 22; *b*, the under view, *c*, the claw, (both magnified) colour pale brown. The peasantry say, that this falcon makes a very good soup, and I remarked, that the stomachs of two which I dissected contained nothing but insects (*grylli*) and grains.

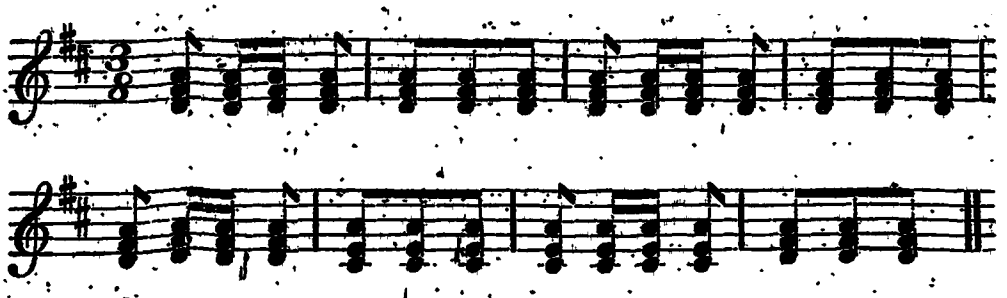
[d] The back and belly are brown, with patches of yellow, the wings and tail brown; the beak is strong, and of a brown colour, except the first half of the lower mandible, which is yellow.

[e] It is 16½ inches long; the two first pen-feathers of the wing, are but indistinctly edged with white; the five exterior long feathers of the tail are each marked with a white spot at the end.

I cannot speak too highly of the hospitable and obliging disposition of the proprietors of Porto Santo, who may be compared with our smaller Welch farmers. I never pursued my rambles without being entreated to turn a little out of my way to drink a cup of their best wine, which was no small temptation, being the pure juice of the richest grapes, without even a dash of spirit; and before we quitted the island, one sent a dozen of this wine, another, two dozen, a third, a fine turkey; agreeably reminding me of the African custom of "making a *dash*" to a stranger: their horses, their servants, all were at my service, and I was obliged to start by daylight, to avoid the necessity of accepting the use of the former (not suiting my route amongst the cliffs and peaks), four of which were sent for me in one morning. Instead of that impertinent curiosity, accompanied by a broad laugh or contemptuous sneer, which a traveller too often meets with from the class immediately above the peasantry in Madeira, who ridicule every thing they do not understand, and always take fresh pride to themselves on discovering fresh proofs of their ignorance; instead of this feeling, which is made more striking by the polished manners of the higher orders, and by the respectful civility of the peasantry, the same class of men in Porto Santo, although prompted by a more laudable curiosity, never ventured to approach an instrument unless I invited them to do so, and then modestly sought some explanation of its use and object.

I had great difficulty in excusing myself from breakfasting and dining with the governor, on each of the three days of my stay, which I made the most of, by quitting the town at sunrise, and never returning until dark. Every evening, however, after I had deposited my spoils in the embryo shop of my friend Battista, and inquired as to the sales of the day, and the rising prospects of the new establishment, we both left off work, washed our hands, and adjourned to the soirée of the governor's lady, who dispensed

excellent green tea, new cakes, and old packs of cards every evening; with the view, as she archly termed it, of civilizing the officers of the militia a little, amongst whom the serjeants were included. She was not handsome, but of very ladylike and agreeable manners, and full of entertaining conversation. Having groped our way to the government house, we were quitted at the portal by a small mob of the humbler friends and acquaintances we had made in the town, (the Genoese in the course of his daily trade, and I amongst the fishermen) strumming the following chords on their guitars (which form the accompaniment to all the national songs of both islands),



all evidently envying us the proud distinction we were on the eve of enjoying,

——————————— videbit
Permixtos heroas, et ipse videbitur illis ;

and whispering a hear-say detail of the pomp and ceremony we should encounter within; the more thriving, dropping sly hints that they were not without the ambitious hope of "jostling with these gods," and sipping the same nectar, before they died. We had first of all, which was not a little difficult, when the whole of the court was assembled there, to squeeze into the governor's library, where we generally found them discussing the informalities of some serjeant's warrant or commission, the fragments of a Madeira gazette, a month old (which had probably been wrapped

round some parcel of grocery from Funchal), and the rising glory and future greatness of the Portuguese nation. Presently, "lights in the sala!" were announced, and after much ceremony in arranging the precedence, the whole party moved up stairs, preceded by the solitary taper which had illumined the assembly below. The ladies were then sent for by his excellency, and entered with due form, each gentleman standing erect with his chair in his hand, not only on their first entrée, but whenever either of them quitted the room, or entered it afterwards. The female party never exceeded three, the governor's lady, the commandant's (a shrewd old woman), and Donna Antonia her daughter, the belle of the island, who disguised a tolerable figure, by a gown resembling a sack with sleeves to it, and a pretty face, by the free use of snuff. Her conversation, however, was sprightly, and her manners pleasing. The greatest ornament to the party was the priest, a liberal, sensible man, an enthusiastic admirer of Livy, and full of interesting information and large views on the catholic missions to uncivilized countries. He spoke French with tolerable ease, substituting whole sentences of colloquial Latin, when he was at all at a loss: his figure was commanding, and his manners very dignified. The militia officers, who, as if wearied by the monotony of their uniforms, looked like so many faded rainbows in their plain clothes, were the most respectable proprietors and farmers of the island. Their conversation, when it did not turn on the cultivation of their land, which their politeness to the ladies would not always allow, abounded in the most singular notions: when I admired a beautiful fragment of *fibrous gypsum*, which lay in the governor's room, and inquired in what part of the island it was found, they observed to each other, with some surprise, that it was evident that its value as a medicine was known even in my country, for I could have no other object in seeking it; explaining to me, that there was formerly a medical man resident in the

island, and that he told them confidently when he quitted it, that this stone, powdered, and swallowed in wine, was an excellent remedy for the gout.

My friend the Genoese excelled, not only in slight-of-hand tricks, of which he possessed a rich variety, but in several other kinds, which were preceded by more or less pantomime. He generally displayed his science after the round game (which never interrupted the conversation of the parties) was over. After several capital tricks with cards, he generally announced another of a different nature, by declaring, that it would be necessary for every gentleman in company, the governor excepted, to stand up and go through the various attitudes which he must exhibit *seriatim*, in order to succeed in the exploit with which he would have the honour to astonish them: and, beginning with some of the less ridiculous, such as standing on one leg and scratching his elevated chin, which every one rose from his chair in turn and repeated, he led them through a series of postures, inconceivably ridiculous in themselves, but exceeding even his own warmest expectations in effect, when imitated by their unwieldy figures and clumsy movements. Some unfortunate serjeant, recently elevated to the rank and the society appended to it, and possessing all the due humility of a younger member, was generally the victim of the ingenuity of the Genoese, who excited a shout of laughter amongst the elder superiors, when in one of the movements he exchanged hats with his labouring imitator, rubbing the crown of that he had just received violently all over his face, as he whirled round, in which he was followed with double earnestness by the other, who, by the artful preparation of the owner of the hat, was all the while unconsciously blacking his own face. Some brilliant deception, however, immediately followed, as if it were the suite of the plot, and the sufferer was compelled to admire and smile. On

another occasion, a more dramatic vein of pleasantry was pursued by the Italian, who humbly requested the Governor to abdicate, and to allow him to appoint a Successor, a Corregidor, and a Commandant, to conduct the apprehension and trial of a criminal, who was afterwards hung behind the door with such capital effect, that the ladies all but fainted; and I was enabled to discover for which of the aspirants Donna Antonio was most particularly interested. But it was the embarrassment, awkwardness, and timidity, with which the inferiors chosen by him would ape the airs of offices to which they had never dreamed of aspiring, while the true possessors were looking on, which Battista had principally in view.

About ten o'clock the officers took leave, some to trot into the country, and magnetise their own families with the polish they were thus gradually acquiring. The Italian went to sleep in his shop, and I (after partaking of a liberal supper of cold fowl, fruit, and preserves, made as I was assured by the lady herself) was conducted to a comfortable room, with a bed decked out with flounced muslin sheets, and a glazed counterpane. The Governor, who always waited breakfast and dinner, and sent the drummer to scour the neighbourhood in the hope of finding me, insisted that I should come home in time one day, and invited the Italian, in his politeness, who insisted first on shaving me (seating me on a barrel of dried fish, which he had in the shop), and then shaved himself, neither was he at all discomposed, when the Governor's Mercury ran into the shop out of breath, and bounced up against him (which by-the-by he could not well avoid, considering his own speed, and the small space in which he was obliged to pull up, in awful admiration of the universal genius of my friend), to announce, that the Governor was waiting dinner for the Senhores. We had an excellent dinner, and the intelligence of the Governor

(who had served in Brazil), the agreeable manners of his lady, the liberal views of the priest, and the humour of the Italian, prolonged our sitting over the dessert, almost to the opening of the soirée.

A soirée in Porto Santo forms a singular contrast to the weekly soirée of a private family in Funchal. From fifty to sixty persons, and sometimes more, meet together, spontaneously, about eight o'clock, without a single effort on the part of the lady of the house; four or five musicians are in attendance, and while one large room is thrown open for cards, the largest is reserved for quadrilles and sarabands. Nothing can exceed the agreeable and well bred ease of the higher class of Portuguese ladies; a stranger almost immediately ceases to feel that he is so, from their amiable and judicious condescension. They generally dress with more splendour than taste, but they dance elegantly, and if the instances of beauty are not near so numerous as in the higher classes of neighbouring nations, they are sometimes very striking. Their figures are generally diminutive, and, too frequently, ill-proportioned and clumsy, but the former fault, rarely wanting, is sometimes redeemed by a fairy-like symmetry. I have often been electrified by the sudden glance of the sparkling dark eye, which is raised to bewitch the foreigners in France—but, when the dark eye of the Portuguese beauty is slowly raised from the ground, where it generally reposes, as if the jealous eyelash would be admired in its turn, it beams with so soft and sweet a melancholy, that it excites the deepest interest, and can never be forgotten. The balls given on particular occasions at private houses, are much more splendid than those of the castle, where a foreigner cannot but feel distinguished, from the kindness and politeness of the present governor, Don Antonio de Noronha. They are often varied by instrumental and vocal music (the former generally good) between the dances, and sometimes by a ballet, performed by the elder children, with great ease, spirit, and humour. As I pushed

my way through the crowd of servants which are in attendance in the halls and door-ways on these occasions, I was much entertained with the anxious gestures of small parties of the palanquin bearers, who had squatted themselves in different corners, playing with dirty packs of cards, for the very hire they were not to receive until the next morning. But I have as much kindness as pleasure to acknowledge, when speaking of the elegant entertainments of the Portuguese of the first class, the liberal hospitality of my own countrymen settled in Madeira, has long been proverbially well known.

CHAPTER IV

Sketch of a Flora.—Geographical distribution of Plants.—Wines.—Cultivation of the Vine.—Soils.—African Imports.—Vegetables.—Dyes.—Timber.

HAD any thing like a Flora of the island of Madeira ever been published, I should not submit the observations I have been able to make, during a short stay there, under the most unfavourable circumstances. The chief obstacle I have encountered has been the season; a great number of plants are underground, others neither presenting flowers or fruit, and a considerable portion, such as the *gramineæ*, entirely burnt up: the rains have been unusually tardy, and consequently, the renewal of vegetation delayed. Other difficulties I look upon as common to all who would undertake a botanical report of Madeira, and only to be overcome by a residence of years, which would allow of a patient investigation. The enchanting landscape which presents itself, flatters the botanist at his first view with a rich harvest, and not until he begins to work in earnest, does he foresee the labours of his task. What can be more delightful than to see the banana and the violet on the same bank, and the *melia azedarach*, with its dark shining leaves, raising its summit as high as that of its neighbour, the *populus alba?* It is this very gratification which occasions the perplexity, at the same time that it confirms the opinion, that Madeira might be made the finest experimental garden in the

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world, and that an interchange of the plants of the tropical and temperate climates, might be made successfully, after they had been completely naturalized there.

The Portuguese once drew their principal supplies of sugar from Madeira[f], but when the cane had succeeded in the West Indies[g],

[f] In the fifteenth century, 400 Venetian cantaras of sugar were annually produced in Madeira, but the relative capacity of this measure cannot now be ascertained. *Colleçao de Noticias*, p. 10. Sugar is still made in small quantities, but it is never granulated. The West-India cane was the only one cultivated until within these few years, when a variety was introduced from Cayenne, which is evidently the Bourbon cane, (*s. luteum* of Tussac) from its short joints, and the colour of the bark, which is of a deep yellow, tinged with red; it is also considerably thicker than the others. The common green cane *(s. officinarum)* has longer and smaller joints, occasionally tinged with a patch of red. The Bourbon yields more sugar, but less juice, than the others, and the only objection to it is, that the cattle will not eat its leaves, being rough and prickly. The sugar cane was sent from Madeira to Vicente, on the coast of Brazil, in 1531.

[g] The Portuguese, however, seem first to have transferred the cane to the Island of St. Thomas, on the African coast, (discovered in 1471-2,) from the curious account of a Portuguese pilot, who visited that island about 1550, when 150,000 arrobas (about 3000 hogsheads) of sugar were exported annually. The soil yielded a crop of ripe canes every five months, the rains and cloudy atmosphere of March and September occurring very seasonably. Several persons were sent from Madeira, to instruct the Portuguese of St. Thomas in making the sugar whiter and harder. *Colleçao de Noticias*, p. 98. When the Dutch fleet, under Jol, took possession of St. Thomas in 1641, those of the islanders who made terms with him, paid 5590 cruzados to preserve their sugar-works. I notice these evidences of the supplies of sugar which the Portuguese formerly drew from Western Africa, (throughout the interior of which, the cane grows spontaneously and abundantly) from the impression that it may *at some future day* become a question, whether the most effectual method of bringing about the entire and positive cessation of the slave-trade, (or, to say the least, to give the finishing stroke to it) and to forestal the great and growing advantages of Brazil, at the same time, will not be to cultivate sugar under the protection of our African settlements, where labour may be commanded at a low rate, to any extent. To encourage even this view—although it would annihilate a commerce insulting to the Almighty, and criminal even in the mere toleration, and hasten the tardy civilization of those, to whom we have yet to atone for ages of cruelty and wrong;—to encourage

its culture was abandoned for that of the vine (introduced from Cyprus[h]), which became more profitable. The number of Scotch and English families which have since resorted to it, have delighted in forming beautiful gardens around their country-houses; and vegetables of every sort have thus been introduced, until it has become impossible to draw the line between those that are indigenous, and those that are naturalized. Added to this, the strong sirocco winds which blow at different periods, must have transported many seeds from the continent of Africa; and its vicinity to the Canaries and Azores, has probably enabled birds to bring many of their vegetable productions to it. A fourth circumstance, although by far the least contributive, also adds to this diversity; that of vessels from all parts of the world touching, and frequently clearing out their cargoes, or cleansing their holds in the port: several seeds have thus been brought, and thrown amongst the rubbish of the shore, which has afterwards been used for manure, and this seems to me the most probable way of accounting for those plants which are at once common to Madeira and America. Was it a primitive country, we might more decidedly pronounce on indigenous plants, but as it is entirely volcanic, its vegetation must have been so progressive, from the lichen to the most stately dicotyledon, that time must have been given for several of the above causes to operate, before its completion. Even at the present moment, as we pass through the country, we see the crustaceous lichens forming beautiful grayish green patches on the basaltic rocks at the

even this view, at the expense of the West India planter, that is, by imposing a lesser duty on the African, would be very unfair; but if the duty being the same, sugar were grown at that low rate in Africa, which would enable us to undersell every foreign colony, or even to supply Great Britain at a lower rate than she is now supplied by the West Indies, surely a discouragement would be both unjust and unwise. Coffee, indigo, cotton, and tobacco might be grown to any extent in Africa, the three latter being indigenous and abundant.

[h] According to Cadamosto, therefore, before the year 1445.

sides of the ravines, while the slightest coating of earth on the same rock presents us with a higher class of lichen, and a moss; as this earth augments, we find the *semperviveæ* and *saxifrageæ*, and thus proceed, until we are shaded by thick groves of chestnuts.[1]

The variety of aspect, the different quantities of moisture (either owing to the constant vicinity of the clouds or the torrents), the greater or less exposure to the sea-breezes, all conspire to render the division of plants into regions extremely difficult. My first visit was to the eastern side of the island, where I fancied I could decide on the different heights of plants, but on going to the westward, there was so little accordance between the two, that I can only now venture upon the greater outlines. I have divided my list into families, that a comparison may be made between the proportions they bear to each other, and that the total absence of others may be more immediately noticed. In doing this, it will be observed, that I have mentioned several, which are as yet but premised, having only been published in the monographs of distinguished botanists, but which will, in all probability, with many others merely intimated, be generally known when the second edition of *M. de Jussieu's Genera Plantarum* appears; an event which is earnestly desired by all followers of the natural system. I am not in possession of any specific descriptions of cryptogamia, consequently, have only been able to notice *genera*, with a few exceptions. With these explanations, I submit the little that I have done, rather than be totally idle in this respect, whilst waiting for a passage to Africa, where my endeavours will, I hope, produce more important results. *See* Appendix, No. I.

I have given what may be called the first, or Vine region, a

[1] Baron de Humboldt observes, that, in countries near the tropics, succulent plants appear before mosses; but I found Madeira to accord with the general rules for the progress of vegetation.

height of 2700 feet above the level of the sea; at the extremity of this, the vine can scarcely be called flourishing, as no wine can be made from it, still it produces eatable fruit. I am confirmed in giving it this height, from finding the plants of tropical countries flourishing, with cultivation, to the same extent[k]. Taking the extreme of the Baron de Humboldt's vine region (corrected after M. von Buch), there is a difference of about 170 feet between us; but the productions of the two exactly accord, excepting, that I found a greater variety and mixture of European and tropical plants[l]. M. von Buch has an intermediate region of African forms, which will not apply to Madeira; and it must be understood, that *all* these plants do not ascend to the *extremity* of this region; for instance, the little *sida carpinifolia* exists in profusion in the lower parts of the island, but totally disappears after we have ascended 1000 feet; the tropical plants are of course *chiefly* confined to the gardens at, or near, Funchal, *&c.*; the few mentioned in the note as confirming the extent of this region, are successfully cultivated in the garden of Mr. Veitch's Quinta, situated at its extremity.

The second, still taking the extreme, extends to 3700 feet. It cannot be compared to the laurel zone, *(regio sylvatica,)* of Baron de Humboldt (reaching to about 4360 feet), but appears intermediate, between the vine and laurel zone of Madeira. The broom

[k] According to Chaptal, the vine is found wild in Europe as far as 45° north, and Catesby assigns the same limit in America.

[l] In it grow spontaneously, the *Agave, Arundo, Canna, Citrus, Cactus, Dracæna, Digitalis, Dioscorea, Euphorbia, Filices, Fagus, Ficus, Hepaticæ, Jasminum, Lichenes, Lonicera, Musa, Myrtus, Phytolacca, Pelargonium, Rubus, Rosa, Sida, Saccharum, Tamarisk, Viola, Vinca, &c.*; and, with cultivation, *Aloe, Arachis, Agave, Annona, Bromelia, Bambusa, Coffea, Carica, Citrus, Canna, Datura, Dahlia, Dolichos, Duranta; European fruits, Erythrinum, Gossypium, Guinea-grass, Gomphrena, Hibiscus, Jatropha, Justicia, Lantana, Laurus, Mangifera, Maranta, Melia, Nerium, Olea, Psidium, Populus, Quercus, Ricinus, Rosa, Solanum, Sicyos, Vinca, Zea, &c., &c.*

here predominates, and may give its name to the region; ferns (*acrosticha*) are occasionally mixed with it, but abound according to locality. In it, we find the *fagus castanea*, flourishing according to situation; in the ravines it is most luxuriant, while in the exposed parts of the hills it is stinted and solitary, but no where confined to streams[m].

The third region, ascending to 5600 feet, is more complicated than the others, being more influenced by locality; it may best be termed the region of Vaccinium and Laurels. On ascending the peak of Ariero to the summit, we find the former shrub forming large thickets on the side next the Coural, while on the other, exposed to the sea, the vegetation is confined to *gramineæ* and *ericæ*; the latter of which only now and then grow to the size of trees. The *juncus* starts up in very considerable quantities, on the same side with the *vaccinium*. On the Poul, (which is on the western side of the island, and, within a few feet, as high as the peak of Ariero) the same *vaccinium* abounds in thickets of small *trees*, which confirms me in giving its name to the region; and as vegetation is more luxuriant on this side of the island, more variety presented itself, the *vaccinium* predominating, and continuing to abound to the summit. In this region we find (besides the *juncus* above mentioned) the *thymus*, *stæhelina*, *sonchus*, ferns of various genera, *nepeta*, *ilex*, *taxus*, *erodium*, *digitalis*, with various small *compositæ*, *&c.* The laurels (which I also consider as characterizing this region, especially the lower part) grow to a very large size on the western side of the island, while, on the eastern,

[m] We also find *Gramineæ*, very abundant in the less exposed situations; the *Verbascum*, *Salix rubra*, *Agaricus*, a small portion of *Ericæ*, *Compositæ*, *Menthæ* (abundant), *Digitalis*, *Rubus* (in great quantities), *Solana*, *Rosa*, *Fuschia*, *Buxus*, (the three last have probably strayed from gardens). *Capsicum*, *Hypnum*, and *Lichens*, all growing spontaneously. The *Pinus sylvestris* has been successfully cultivated in the lower part of the region.

they do not attain the height of the *vaccinium*, and are by no means large. On the top of Ariero, I found two or three solitary plants of the little *viola odorata*, in the most exposed situations: on the western side of the island, which is the most sheltered, the *clethra* formed large trees, and the *digitalis* grew at their feet. I have thus mentioned the *clethra* separately, because I believe it to be nearly peculiar to the peak of Ruivo, at the height of this region. Travelling directly eastward, (where the soil is composed of a deep red earth, containing more alumine than the ordinary red tufa, where vegetation is more scanty, and loses all that rich variety which is found to the westward) we find the broom prevailing at 2000 feet above the sea, and dwarf *vaccinia*, mixed with broom, heath and bramble, on the downs near the Pilgrimage House of Antonio de Serra (about ten miles from Funchal), which are not more than 2500 feet above the sea, but comparatively close to it.

The fourth, and last region, about 6000 feet high, is formed by the upper part of the peak of Rũivo, and consists of arborescent *ericæ*, patches of *gramineæ*, and here and there a solitary fern.

There is no end to the varieties of the vine in Madeira, if you listen to the cultivators, no two of whom, however, agree in giving the same name to the least important. I had no opportunity of seeing the fruit, but have examined the leaves of the only varieties which the cultivator thinks it worth while to separate; collecting them from different vineyards, and comparing them carefully, so as not to be deceived in the names, which a person may easily be without this precaution. The juices of the *verdelho*, *negro molle*, *bastardo*, *bual*, and *tinta*[*], are commonly mixed together, to pro-

[*] The *verdelho* leaf has seven lobes, the sinuses of which are not strongly marked; it is of a dark green, but perfectly bald; the two lowest lobes are very indistinct. That of the *negro molle* has five distinct lobes, the two lowest closing, but not adhering, over the stalk; the sinuses are deep and round, the dentations large and

duce the best Madeira wine, or that made in the southern part of the island, which is principally indebted for its flavour to the two latter. The *tinta*, when separated, produces a wine closely resembling Burgundy, in colour and flavour, when new, but much softer; becoming very like tawny port after it has been about two years in the cask; and not distinguishable, either in colour or flavour, from rich old Madeira, at the end of twenty years. It is the only red wine made in the island, and is suffered to ferment with the husks of the fruit remaining in it, to fix the colour. It would retain the character of Burgundy longer, were it bottled earlier; but then there is the probability of its acquiring a bad flavour from the sediment. The paler vines, such as the pure *verdelho* or north wine, acquire an amber hue with age; whereas, those whose husks impart some portion of colour to the juice during pressure, grow lighter with age. The *sercial*[a] is said to be the hock grape, brought from Europe; this I cannot speak to, having no description of the hock grape, but it strikes me, that although the *sercial* is a dry wine, it is very unlike hock of an age

rounded; it is slightly downy at the back, (the nerves strong and projecting) and of a dark yellow green, inclining a little to red at the base. The *bastardo* leaf is rounder than most others; its lobes are indistinctly marked, and the dentations are large and sharp; it is of a light yellow green, downy at the back, and the whole assumes a cockled appearance. Four of the sinuses of the *bual* leaf are very deep and sharp; the two lower are indistinct; the dentations are sharp and irregular; the leaf is hairy on both sides. There are two varieties of *tinta*, the largest has seven lobes, decreasing in size, and the sinuses very deep and rounded; the middle lobe is subdivided into two others, both indistinct; the smaller is of a more compact form, and the lower sinuses much less deep than the others; both are of a dark green with purple spots, and downy at the back.

[a] The leaf of the *sercial* has four rounded sinuses; the nerves are very strong, and by their projections give a cockled appearance to the leaf; it is of a very yellow green, and cottony on both sides. It is said to grow best under precipices, in places which attract the clouds, and as the husk is very thick, is left longer than the others to ripen.

to be transported. There are at least three qualities of Malmsey: the *cadel* or candy[p] is the best, but produces little; the *babosa* and *malvazion* yield pretty abundantly, but the latter is very inferior[q]. The fermentation of malmsey is checked earlier than that of the other wines, to increase its sweetness.

The best soil for the vine is *saibro*, or an equal mixture of *saibro* and *pedra molle*, or of the red and yellow tufa; the latter, from its lightness and looseness would be washed away by the rains, were it not mixed with some other soil. Equal portions of *saibro*, *pedra molle*, and *massapes*, which is a clayey earth, seem to be preferred in very dry situations, and I have seen layers of *pedra molle* alone, about the roots of the vines, in unusually moist localities[r]. Of course the poorer cultivators are compelled to be content with the soil they find upon the spot, but when this

[p] The leaf of this has four very deep and rounded sinuses, with two others less distinct; each dentation has a small yellow tip; the back of the leaf is as smooth as the upper surface, and it is of a deep yellow green; the other varieties are less marked, but all have the same smoothness and yellow tips. It was introduced from Candia, before 1445, by Prince Henry. *Colleção de Noticias*, p. 11.

[q] The vine was tried in the island of St. Thomas, on the coast of Africa, before 1550; but, although two crops were produced, it did not succeed, as it was concluded, from "the gross richness of the soil." The figs became delicious, and yielded two crops a year; the melons only one; olive, peach, almond, and other stone-fruit trees were introduced from Spain, but although they grew beautifully, and to a very large size, they never yielded any fruit. *Navegaçao de Lisboa a Ilha de S. Thomé, escrita por hum Pilato Portuguese*, (in 1551.) *Colleçao*, p. 99.

[r] I analyzed the *saibro* carefully, and found 46.8 *silex*; 9.1 alumine; 27.3 oxide of iron, 2.7 soda; 3.8 water; 10.3 loss (principally vegetable matter), at a red heat in a *platina crucible*. The *casealha*, a decomposing basaltic conglomerate (partially deposited above the compact or columnar), is esteemed next to the *saibro* and *pedra molle*; this is the heaviest soil, the specific gravity being 2.1. The *barros* (a coarser and less pure kind of clay than the *massapes*), and *marracote*, a drier kind of *barros*, are the least welcome soils a vine cultivator can find on his tract. The *pedra molle* seems to contain less soda, as well as less iron, than the *saibro*, which is of a lower specific gravity. *Saibro*, 1.75; *pedra molle*, 1.95; *massapes*, 1.99; *araya*, 1.99.

happens to be *massapes*, they mix the *arraya* (the volcanic cinder before mentioned) with it, and it is considered, that the vine endures longer in this than in any other soil. It is said to last sixty years in it, if planted wide enough apart. The ground being turned up, the trenches are dug from four to seven feet deep, according to the nature of the soil, and a quantity of loose or stony earth is placed at the bottom, to prevent the roots reaching the stiff clayey soil beneath, which would oppose their growth. They water the ground three times, if the summer has been very dry, leaving the sluices open until the ground is pretty well soaked; the less the ground is watered, the stronger the wine, but the quantity is diminished in proportion. Some cultivators lay cow-dung at the roots of the vines when they plant them, and when the wine becomes poor, mix a fresh quantity with the soil at the surface: others consider that animal manure injures the flavour of the grape, and sow the *lupinus perennis* among the vines instead; this they do in the January of every second year, cutting it down and burying it, by turning over the surface of the soil, after the small rains, which prevail for about ten days at the end of April. An English acre will produce four pipes of wine under the most favourable circumstances; but one pipe seems to be the average, taking the vineyards throughout the island*. The propagation is by cuttings, and they prefer the *verdelho* of the north, when forming a plantation in the southern part of the island, as it improves considerably from the better soil, climate, and aspect; on this they engraft any other variety they may wish:

* The lizards devour immense quantities of grapes; and are said to manifest a decided preference for the *tinta*, but this, probably, is merely because the *verdelho* grapes are not ripe so early in the season. A cultivator dares not allow his grapes to remain on the vines after his neighbours have taken in theirs, however much he may wish to do so; for if he did, all the rats of the neighbourhood would adjourn to his vineyard, and take a ruinous tithe.

the grapes yield no wine until the fourth year[t]. The stalks of the *arundo sagittata* (the tops of which are good for feeding cattle), are used in making frames for supporting the vines, in the southern parts of the island, and the *salix rubra* for tying them to this trellis-work. In the north part of the island the vines are trained around the chestnut-trees, this firmer support being necessary, as it is said, on account of the high winds prevailing there; but they generally neglect to cut away the branches which prevent the sun from reaching the vine, and it evidently languishes in the vegetable soil natural to the chestnut-tree. If a layer of light siliceous soil, which the adjoining tufa would furnish, were laid above the vegetable earth, both trees would flourish equally. The vines give fruit as high as 2700 feet in Madeira, but no wine can be made from it: the greatest height at which it is now cultivated for this purpose, is in the valley of the Coural das Freiras, which is 2080 feet above the sea. There is much dispute as to the best moment for pruning the vines; some prefer February, others the middle of March; it depends principally, however, on their foresight as to the weather when the flowering takes place, which is from six weeks to two months, after the pruning. As to the treatment of the wines, I have remarked, that the produce of one year must frequently be treated very differently from that of another. When the grapes are green, the fermentation must be checked; when they are wet from unseasonable rains, it must be assisted; generally speaking, the riper the fruit, the more difficult the fermentation. A very agreeable *liqueur* is made in the island from the second pressure of the grape, (the first being merely with the feet) into which an equal quantity of brandy is immediately thrown, to stop the fermentation, and

[t] Miller, in his *Gardener's Dictionary*, tells us, that in some parts of Italy, there are vines which have been cultivated for 300 years; and that a vine not more than a century old, is there called young.

produce sweetness. Gypsum is pretty generally used to clarify and mellow the wines while working, unless they happen to be of a green vintage. The importation of foreign brandy is now prohibited, and even that made in Portugal is subjected to a duty, amounting to a prohibition; it is made from the north wine, and the lees of others. In the war time, all the houses were compelled to ripen their wines by stoves, as they held no stocks: those who managed this themselves, rose the heat gradually, from about 60° to 90°; others who trusted them to the public stoves, generally found, that they were neglected until the last moment, and then all but boiled[u].

The wheat grown in Madeira, scarcely amounts to ¼ of the quantity annually consumed. Near the sea the lands yield annual crops[x]. The maximum of the proportion is fifteen to one, but the average five to one. The *zea mays* is so easily procured from the neighbouring continents and islands, that no one has thought it worth the trouble of planting for any other purpose than to look at; but it would succeed extremely well[y]. I was assured at Lisbon, that

[u] 22,314 pipes of wine (of which 101 went to the bishop) were made in Madeira, in 1813.

[x] 77,604 English bushels of wheat, 11,616 of rye, and 12,768 of barley, were produced in 1813. The Portuguese endeavoured to grow wheat in St. Thomas's in the sixteenth century, trying all the different localities and seasons successively, but it never ripened, or produced full ears. *Colleção de Noticias*, p. 101. Cadamosto writes in 1445, that Madeira produced 30,000 Venetian *stajas* of wheat annually, (equal to about 1966 P. bushels of 675 cubic inches each) adding, that the soil had at first produced sixty for one, but then only forty and thirty for one, and that it daily deteriorated. In the higher and northern parts of the island, they get but one crop of wheat every seven years, allowing the broom to grow uncontrolled for six, and then burning it on the ground as manure, using no other.

[y] The variety most esteemed in Madeira, is the '*white-round*,' imported from the Cape Verde Islands and New York, which will always fetch twenty pence a bushel more than the '*yellow-flat*,' which is grown on the coast of Africa, and in the Azores. The '*yellow-round*' (imported from Philadelphia, the Azores, Genoa, and other parts

the *sea mays* is sown in the provinces immediately after the wheat harvest in June, and is ready for taking in in October; the same land thus yielding a crop of each in the same year. Rice is merely

of the Mediterranean,) is considered the second best variety, and the '*white-flat*' (from the Azores and America,) the third; and even this will fetch sixpence a bushel more than the *yellow-flat*. In the Canaries the *yellow-round* is preferred. The exporter may get six and a half bits the alquiem (six shillings and fivepence the English bushel according to the present rate of exchange) for the *white-round*. I am thus particular, in the hope of inducing the cultivation of the more profitable variety on the Gold Coast. "Before Mr. Hope Smith's government, the natives of the Gold Coast scarcely grew corn enough for their own consumption; famines sometimes resulted from the Ashantee invasions, but as often from their own indolence, never from the unkindness of nature, who has, perhaps, been too prodigal of her bounties for the rapid increase of African industry. The natives were persuaded and excited to grow corn largely in the neighbourhood of Succondee and Accra, and within the last two years, I am positively informed, by a commercial resident, at least fourteen vessels have been laden exclusively with *corn*, for Madeira and the West Indies. Several cargoes had been exported during the short period of Mr. Hope Smith's government which preceded my departure from Africa." *Bowdich on the British and French Expeditions to Teembo, with Remarks on Civilization in Africa, &c.*, p. 12. In Fantee, a puncheon of corn (equal to two chests) well heaped up, (so as to give nearly a bushel in excess) costs the shipper an India Romal, worth twelve shillings in England, or about twelve shillings and sixpence to the importer in Africa. At Accra, it is to be purchased still cheaper. It must be understood, however, that that is the price during the three or four months after the harvest, (in August,) when it gradually becomes dearer. It is not considered hard enough for shipment before October. In the time of the slave trade, the Governor of Annamaboe Fort was obliged to send to Succondee (nearly fifty miles off) for palm oil to light the lamps: the last Governor collected and shipped upwards of 1200 puncheons in twelve months. It has been found very advantageous to export it into Brazil, for the sake of the negroes alone, who cook almost every thing in it, and are as passionately attached to it as their countrymen in Africa. "A great deal has been said of the improbability of getting any thing but gold and ivory as a return from Africa. I submit two facts in reply. The palm oil trade at Calebar did not exist in the time of the slave trade; it was created and necessitated by the abolition. It was felt to be very laborious by the natives at first, in comparison with the indolence of the slave trade; but no easier commerce could be devised, for it was the only natural product which immediately stared them in the face. This trade grew under the care of a few persevering Liver-

cultivated in the gardens as an ornamental grass[2]. In Madeira they sow the wheat from October, to January, taking it in in June; and it is followed by beans, or sweet potatoes (*convolvulus batatas*); the latter of which are dug up at the end of six months, if planted after wheat, but not until after twelve, if planted with vines; the tops make excellent food for cattle; horses, however, will not eat them: they are propagated by the offsets of the tendrils. The potato is growing into favour with the natives, and has greatly increased the population of the interior; they now cultivate it in the European manner, but formerly planted the tops after clearing away the tubercles; seven pounds have been found to produce

pool merchants, and from eight to ten large vessels, averaging 300 tons, are now annually laden with palm oil in the Calebar River. The people of Calebar are now peaceable, mannerly, and hospitable, compared to what they were in the time of the slave trade; industry has worked off the moral virus of this traffic, and like the people of Gaboon, whose forests of dyewood and ebony never felt the axe before the abolition, they are much more to be believed and respected than the negroes of the Gold Coast settlements." BOWDICH, l. c. p. 11, 13.

[2] "The rice from our part of the Coast of Africa, is complained of as reddish; were it white, it would sell here in considerable quantities, at forty reis (say twopence) a pound, when the market was fairly stocked, and at sixty when indifferently; the present supplies being irregular. Rice is to be bought in the proper season (October) at Garraway's, (in the neighbourhood of Cape Palmas) at about five pounds per ton. I believe it is always worth thirteen pounds a ton at Sierra Leone, and I recollect to have heard, that a cargo sent from the coast to the West Indies, arriving soon after the hurricanes, fetched forty pounds a ton. Rice is also grown in quantities in the interior, on the banks of the Adiree or Volta, which is navigated 150 miles in-land, or as far as Odentee on the confines of Dagwumba, by the salt-carriers of Adda. See *Bowdich's two-sheet map of Western Africa*, and the accompanying *Essay*, p. 15. The establishment of a fortified market on one of the islands, about 100 miles up the Volta, would open a new and vast source of commerce, unshackled by the brokerage and impositions of the people of the water-side; and lead to a direct intercourse with the commercial kingdom of Dagwumba, the grand resort of the caravans from Houssa, Cassina, and Bornoo, and celebrated as an emporium, even on the banks of the Mediterranean.

448 pounds*. Although three crops of potatoes are to be had annually in the lower, and two in the upper parts of the island, most of the peasantry remain obstinately attached to, and generally cultivate (merely, as they confess, because their fathers ate it) a species of *arum*, said to be the cocos of the West Indies. The leaf answers to Persoon's description of the *arum peregrinum*; it is said never to flower here, whether the climate is not warm enough, or whether the mode of cultivation does not favour its fructification. It is very abundant, and thus managed: a trench is dug and filled with freshly-cut broom, earth is immediately strewed over it, and in that earth is put the root, the tubercle having been taken off, and the tops cut; the few fibres which form the root itself being thus left to propagate it: it requires a great deal of water. The crops are triennial on the hills (that is about 2600 feet above the sea), but annual in the lowest parts of the island. The leaves are so acrid that none but pigs will touch them, and the root is kept a long time before it is cooked. The natives call it *inhame*, considering it to be a yam. A slice dried in the bath of an alembic lost more than half its weight; and on kneading it in water I found no *gluten*, but a considerable portion of *amidon*. The *dioscorea alata* is cultivated in gardens, but the *d. sativa* (of Linnæus) is indigenous; it is good eating, but requires many hours boiling: it only grows on the heights behind Porto Meniz, at the north-west point of the island, and was, until lately, only known to a few of the poorer inhabitants. Perhaps, instead of pronouncing it indigenous, we ought to conclude that some *chance* has transported it hither. Persoon refers it to India only, and until my arrival in Africa, I cannot ascertain if it also belongs to

* Potatoes are now cultivated within the Tropics, and in the plains of Siberia; in Chili, at 11,000 feet above the sea; and in the Environs of Quito, almost under the Equator, at only 1150 feet. See M. Dunal's *excellent Monograph on the Genus Solanum.*

that continent. It is an elegant plant, and would answer much better than the *arum*, as all cattle will eat the herbaceous part. It is remarked by Baron de Humboldt (*Essai Politique*, &c. p. 407), that he did not find the *d. sativa* of Linnæus in South America, and that it has not as yet been met with in the islands of the South Sea; and he adds, that the leaves of yams differ so much from cultivation, that doubts may be entertained of the number of species contained in this genus: it appears to me, however, that the *d. sativa* is very distinct; as it not only differs in leaf, but also in its stem, which is small, delicate, and cylindrical, without a trace of the lobes of the *d. alata*. The chestnut (*fagus castanea*) has proved a very valuable introduction; it forms the principal part of the timber of the island, and of the winter food of the peasantry. The *sicyos parviflora*, cited by Persoon, as indigenous to Surinam, and called the *tchu-tchu*, yields abundantly, and would be a very valuable addition to the vegetables of the tropical parts of the Old World, as well as to Europe.

I found the woad (*isatis tinctorea*), at Praya Formosa and at Campanario. The *ruivinho*, generally found in the heights, is certainly the true madder, although I could not see it in flower. The stalk is that of the *rubia tinctorum*; its leaves are rough at the edges only, whereas those of the variety *sylvestris* are rough on both sides, and are in whorls of four and two leaves, instead of six or seven; neither are they linear and rough above, as in the species *angustifolia*. I am thus particular, because they are cultivating the wrong species near Lisbon, and are not aware that the true one is indigenous to Madeira. The roots of the madder should be allowed to swell in the ground for three years, and then they will produce nearly 400 pounds to an acre, but it exhausts the soil more than any other plant, except the indigo[c]. The

[c] The indigo thrives well in the gardens, and seems to be free from its destructive insect.

peasantry gather it wild, without considering its age or size, and dye their petticoats and cloaks with it. The *turmeric (curcuma longa)* grows luxuriantly. I found two solitary plants of the weld *(reseda luteola)*, near Camera de Lobos. A decoction of the *vinhatico* berry produced a tolerable brown dye, for woollens only, but it yielded no precipitate. Would not the berries of the *fuchsia coccinea*, which is so abundant here, produce a fine dye? I am too late to procure any. The *salsola* grows more abundantly on the Desertas than in Madeira, and is an article of commerce.

I have been somewhat puzzled with the laurels (wanting almost entirely on the continent of Africa), which are so interesting from their uses, their beauty, and the height at which they grow, that I was very desirous of gaining exact information respecting them; but I have scarcely had one perfect flower. The *laurus fœtens*, so distinguished by its little tuft of hairs at the angle of the nerves, could not be mistaken. The *vinhatico*, the wood of which is used as mahogany, and is not unlike it in appearance, is one of the most valuable productions of the island; it is the *laurus indica*. The *til* has been confounded with the *l. fœtens*, from the strong disagreeable smell of its wood when first cut; it is also valuable for its timber, which is extremely hard and tough, and used for rafters: it is mentioned by Baron de Humboldt under the name of *laurus til*, but in looking over the last edition of Persoon's *Enchiridium*, I find that my description of the *til* exactly answers to that of the *l. cupularis*, referred to the Mauritius[a]. The only mention of a

[a] I suspect that the Portuguese call both the *laurus fœtens* and the *laurus cupularis*, *til*; for they say that there are two kinds of *til*, and that both are equally fœtid. When freshly cut or planed, it is impossible to support the odour, which is of the most disagreeable nature. It will not bear exposure to weather. It is of a deep brown colour, resembling walnut, but much prettier. A square prism of this wood, twenty-four inches long and one on each side, leaving a distance of twenty-two inches between the props of support, and suspending the weight from the centre, bore 446 pounds at the moment of its breaking; the prism weighed thirteen ounces one

laurel by Willdenow or Persoon, the oil of which serves for burning, is the *l. glauca*; but it does not answer to the characters of the laurel used in Madeira for the same purpose, which is much more like the *l. persea*, were it not for the size of the fruit, which is that of an olive, rather than a pear; it has a very fragrant smell, but without a better specimen I cannot decide it; perhaps its umbellate bunches may refer it to the *l. umbellata* of Persoon. The *taxus baccata* grows on the sides of the Coural, to a sufficient size to admit of its being made into tables and chairs. The cedar of Madeira[e], is the *juniperus drupacea*, which had only hitherto been found (by Labilliardiere) on Mount Cassius in Syria[f]. Two

pennyweight. The *vinhatico* bore 361 pounds, and weighed eight ounces: it is an excellent substitute for mahogany. The chestnut (*fagus castanea*), which is always preferred for such works as are exposed to the weather, weighed five ounces and bore 264 pounds. See an account of similar experiments on the strength of the timber used in Bengal, in the *Transactions of the American Philosophical Society*, by which it appears, that a similar prism of the *soondry* bore 593 pounds, and weighed fifteen and a quarter ounces. The teak bearing 449 pounds, and weighed eleven ounces. The same bulk of pure water, weigh 13¼. It would seem from the experiments there recorded, as well as the three I have made, that the strength of the wood increases with its gravity. Firs full of resin, however, such as the Baltic red fir, weighs a fraction, and bears a few pounds less, than those (such as the Nepaul fir) which are not. A prism of the heath (*erica arborea*), which is of a yellowish rose colour, but brittle to work, weighed fourteen ounces; of the *cactus opuntia*, (which remains flexible until dry, and then becomes brittle and shrinks up to one half of its original dimensions) three ounces six pennyweights; of the *dracæna draco*, 8.96; the prism of heath wood was cut from a trunk three and a half feet in circumference; that of the *cactus* was two and a half feet.

[e] Cadamosto had justly designated it as "*muito cheiroso e semelhante ao cypreste*;" the indigenous species of *cypress* is new. *Cupressus Madeirensis foliis multifariam, imbricatis, alternis, ramis pendulis, strobilis globosis, squamis, mucronatis, quadriloculatis, polyspermis. Flor. ignotis.*

[f] The Camera have, within these few years, strictly forbidden the cutting down of the cedar-tree, having remarked, that the springs which they sheltered, disappeared, and that in a very short time afterwards; the *physiciens* of the island, still obstinately attached to those systems which are everywhere else forgotten, insist, that these

varieties of the African Banana have been naturalized, but confine themselves to the lower parts of the island; when cultivated, however, they grow at a considerable height, and the leaves (before they are fully developed) are now found by the coopers to be very superior to the rushes formerly imported from Lisbon, for the headings of the wine casks. The Guinea grass is cultivated and thrives well; I have not been able to find a good description of it: therefore, after dissecting and examining a great many locusta, I have given the results[g].

To complete the idea of that happy medium and variety of climate, which makes Madeira preferable even to Teneriffe, or a garden of naturalization; the *phœnix dactylifera* flourishes and bears fruit; pine-apples *(bromelia ananas)*, and custard apples *(annona squamosa)*, are grown in the open air; the arrow-root *(maranta indica)* succeeds perfectly well, the *dahlias* flourish and produce seed, the *arctotis angustifolia* becomes a shrub, the *camellia japonica* astonishes as as a considerable tree, the *[illegible]* and the *pelargonia* form thick hedges many feet high, the *ricinus communis* becomes a tree, the *papaw (carica papaya)* and the

streams are kept up by attraction, and will not hear of the sheltering of the soil from the powerful action of the sun, after the heavy rains, and the consequent diminution of evaporation as an adequate explanation. The first Governor, Zarco, entailed this inconvenience, which might have amounted to a calamity, on all future generations, when he indiscriminately set fire to the thick woods which covered the flanks and tops of the mountains. All the colonists, men, women, and children, were compelled to fly into the sea to avoid its fury, where they remained two days and two nights, up to the neck in water, and without food; it is said to have continued burning upwards of six years. *Colleção de Noticias*, p. 9.

[g] *Panicum polygamum*, (Guinea grass.) Involuc. parvum, valvis simile spathæ. Flores polygames. Gluma biflora, 2-valvis. Calyx 2-valvis ovatis, acuminatis. In florem hermaphroditum, ovarium parvum. Styli duo, plumosi, rubri. Stamen unicum. In florem masculum, stamina tria. Flores laxè pamiculati. Articulationes villosæ. Folia glabra, lanceolata, acuminata.

guava (psydium pyriferum) attain a large size, and produce good fruit[h], and the *melia azedarach* flourishes in great beauty[i].

[h] The gooseberry bushes do not bear good fruit under a height of 2000 feet; the mulberries are singularly fine, and there is a standard nectarine-tree in Mr. Veitch's garden upwards of thirty feet high.

[i] It stands the frosts of the higher parts of the island. In India, this tree is valued for its wood, which is white and durable, and much used for household furniture. *Ainslie's Materia Medica of Hindostan.* An oil may be extracted from its berry which defies the approach of insects; a small piece of cotton dipped in it, and tied to the leg of a table, will even prevent the smaller reptiles, such as lizards, from coming near it, and the only drawback on this valuable property is its disagreeable smell. M. Decandolle mentions, that the *m. azedarach* has withstood a cold of 23° Fahrenheit, on the lake of Geneva; there is no doubt, therefore, that so useful a tree might be naturalized in most parts of Europe; and its beauty and fragrant bunches of flowers would adorn our shrubberies. The Portuguese consider the myrtle to be the hardest wood, and there are now standing, trees of it nearly three feet in circumference. They do not seem to be aware of the extraordinary durability of the vine, which Pliny asserts, (l. 14. c. 1,) instancing a statue of Jupiter at Populonium, formed out of an entire piece of that wood, which had existed many ages, and was still free from any [illegible] of decay. I do not think they have ever been able to cut any planks from the [illegible] (although there is said to be one on the north side of the island, so large as to produce a pipe of wine) whereas, we know that the great doors of the Cathedral of [illegible] of vine wood, and that the planks are more than thirteen feet [illegible] and a quarter [illegible]. The largest tree I have seen in the island is a sweet chestnut, twenty-five feet in circumference.

In 1815 the population of Madeira amounted to 90,916; it is supposed to be upwards of 100,000 at present. It has evidently sprung from several mixed sources. Among the Arabic documents in the Torre de Tombo, there is a letter from the Moors of Cafy to King Manuel, dated 1509, complaining, that the new Portuguese Governor, Diogo de Azambrya, after entering into their town, "with a cane in his hand, and some sweet basil in his mouth," and giving every pledge of his future prudence and justice, suddenly seized several Moorish and Jewish merchants, and sold them to the brother of the Governor of Madeira, who happened to be there at the time with troops. *Documentos Arabicos, copiados dos Origaes da Torre de Tombo, Lisboa*, 1790, p. 11—24.

CHAPTER V.

Zoological, Meteorological, and Barometrical Observations.—Flood of Madeira.

COULD I have afforded to have invited the fishermen and peasantry to bring me specimens of all the fishes, birds, *&c.*, they knew, or might meet with, promising a fair price, I might have done much more for zoology in general. A traveller who has only his own slender means to depend on for every expense of his enterprise, can do but little for zoology; but, even as it was, I had frequent occasion to lament the necessity of throwing away new and interesting objects, especially fishes, because no museum had furnished me with spirits and cases to preserve them in. It is not fair to impose this expense on the zeal of the traveller who contributes his services gratuitously. I have a few more zoological notices to submit, however, and expect to add some new fishes to the 2500 already known and described.

I shall endeavour to follow the ichthyological system of Cuvier, the most natural, although the most difficult to class by[k]. Dr. Hamilton acknowledges its superiority, when he writes, if I mistake not, that had he been acquainted with it, when he undertook

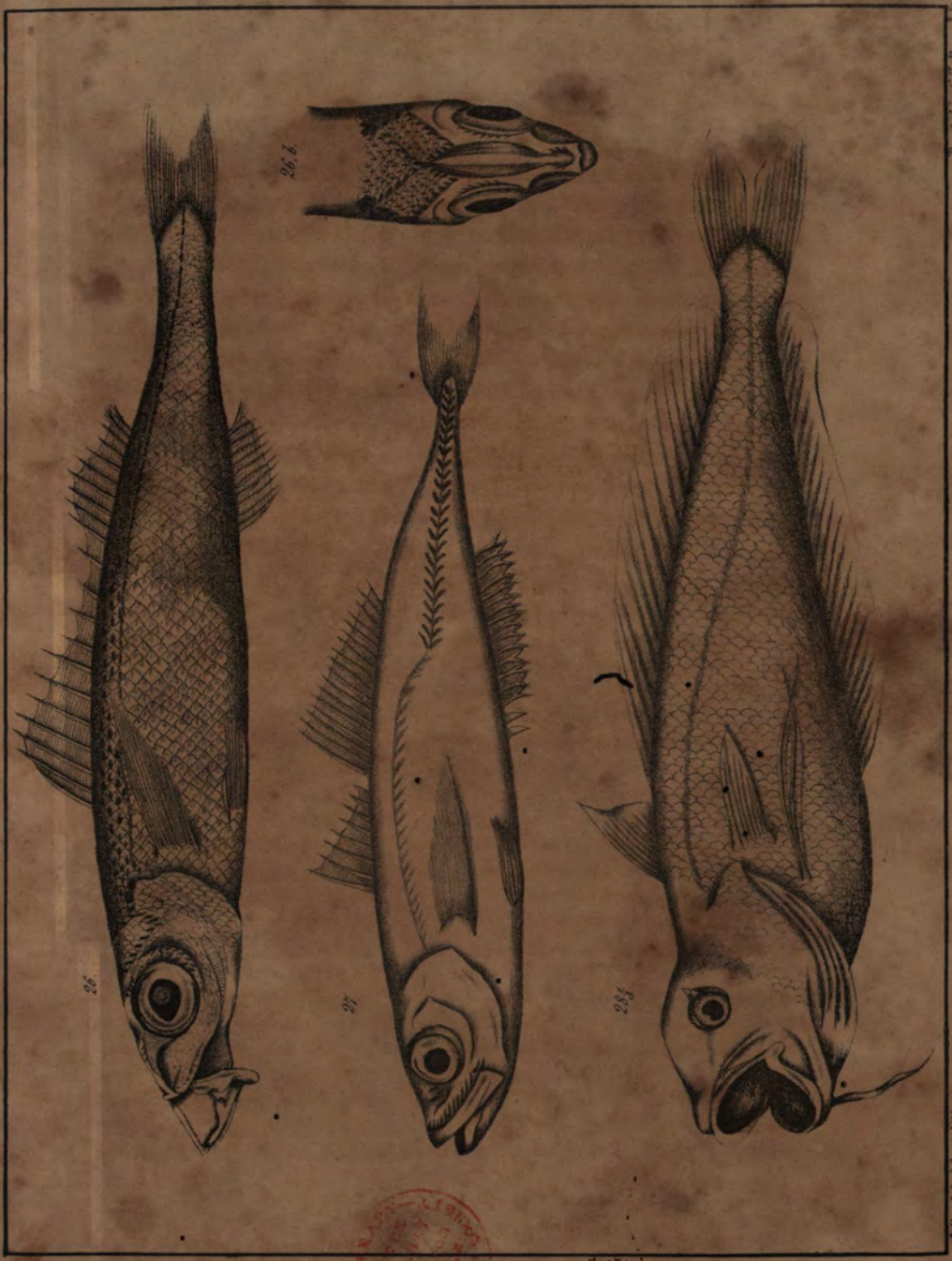
[k] "La classe des poissons est de toutes, celle qui offre le plus de difficultés quand on veut la subdiviser en ordres, d'après des caractères fixes et sensibles. Après bien des efforts, je me suis déterminé pour la distribution suivante, qui dans quelques cas pêche contre la précision, mais qui a l'avantage de ne point couper les familles naturelles." Cuvier, *Règne Animal*, Tome II. p. 110.

his work on the fishes of the Ganges, he should certainly have adopted it in preference to every other. I will first notice those which appear to be rare, or distinct from any already known, in most instances giving the native name. The *abrota*, or *phycis furcatus*. fig. 28, a new species of a genus of *malacopterygiens apodes*[l]. The *boga*, or *boops vulgaris*, Cuvier; *sparus boops*, Linnæus. The *pequeno dourado*, fig. 29, a new genus of *labroïdes* approaching to *sparus*[m]. The *marracho*, a new species of *serranus*[n].

[l] *Phycis furcatus*, B. It has no evident teeth; two dorsal fins, the first short, terminating in a point; the second extending two-thirds the length of the back, and reaching almost to the caudal, *which is so deeply forked as to appear separated*; the anal, corresponding in form, length, and position to the second dorsal; the pectorals rather small, with two barbillons beneath each, but more advanced, or nearer the branchial rays; all these fins are fleshy, and without distinct rays, which are represented by mere streaks. The species I describe (which was merely sent me to look at, without the liberty of dissecting) had a barbillon beneath the lower jaw. The head is elevated, enlarged, and without scales. Its bladder bursts immediately it is taken out of the water, and rising into the mouth, has often been mistaken for an enormous tongue. The body is of a silvery lead colour, inclining to brown; the gills and muzzle red; the iris of the eye yellow; length, 1 foot 8 inches.

[m] *Labeo Sparoïdes*, B. The pectoral fin is placed so low and distinct from the branchiæ, that it is hard to say whether it is the pectoral or the ventral which is wanting; the scales of the head are scarcely visible; the dorsal and caudal fins have the same number of rays and spines as the *sparus salpa*, but the anal has fourteen spines, and three branching rays; the pectorals, five branching rays; all the fins are of a golden hue, shaded with blackish brown; the top of the head is of a golden green; the body a light silver gray, with ten golden stripes, the dorsal line running along the third; the muzzle is silvery; the iris is yellow, and there is a brown rim around the eye. Labeo, the name of a fish known to the Romans.

[n] *Serranus rufus*, B. Its preoperculum is fringed rather than toothed; it has one sharp spine within, or towards the centre of the operculum; the whole body is thickly covered with small scales; the dorsal fin has ten spines and thirteen branching rays, and is red, shaded with a greenish brown; the caudal has nineteen branching rays, and is entirely of a greenish brown; the anal, two spines, and nine branching rays, and of a reddish brown; the ventral brown, with one spine and five branching rays; the pectorals red, and with sixteen rays; the whole of the body is of a brilliant red; length 6¾ inches.


26. b
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The *chinchara* or *chixarra*, fig. 27, a new species of *seriola*[o]. The *diodon tigrinus*. The *imperador*, which agrees with Cuvier's brief description of the *barber*, or *serranus anthias*, (supposed to be the *anthias* of the ancients) which, however, does not notice, that the preoperculum finely dentated above, has larger teeth below, a character which approximates it to the genus *plectropomes*. It in no respect agrees with Bonnaterre's description, or figure of the *barber*[p]. The *garoupa*, or *serranus scriba*. The *requeime*, a new species of the *scorpæna* of Schneider; it resembles the *scorpæna scrofa*, but differs, from its scales being smaller, and from having no fleshy appendices to the head or dorsal line[q]. The *boqueirao*, fig. 26, a new species of *smaris*[r]. The *spet* or *esox sphyræna* of

[o] *Seriola picturata*, B. It has no apparent teeth, no scales, and two detached spines in advance of the anal fin; the dorsal line is faint, and curved; branched on one side only until it arrives beneath the middle of the second dorsal fin, where it makes a descent, and is continued in a straight line branched on both sides, and much more pronounced; the first dorsal fin has seven or eight rays, the second seventeen, both are of a pale brown; the rays of the caudal are very minute, and its colour is the same as that of the dorsal, with a red tinge; the anal has fifteen forked rays, and is white; the ventral is tinged with red, and has five branching rays; the rays of the pectoral are about twenty-five in number, but are two minute to reckon accurately. It is of a light silvery green, the head of a dark green, the under jaw of a bright silvery appearance; the back of a dark blue green with a metallic lustre; the belly is like the under jaw; the whole fish has a brilliant silvery hue. It is 6 inches long.

[p] It is of a brilliant rose colour, with a dash of violet; the stripes on the head and operculum violet; the back mottled with yellow; the fins red, mottled with yellow; the ends of the dorsal and the middle of the caudal of a bright yellow; there is a violet mark round the eye. It is 7 inches long, from the lower jaw to the fork of the tail.

[q] *Scorpæna Kuhlii*, B. The dorsal fin has eleven spines and eleven rays; the caudal seventeen rays; the ventral six rays; the anal four rays and three spines; the pectoral seventeen rays. It is of a beautiful yellow red, the caudal fin deeper in colour than the other parts; the body has a golden hue, and is spotted with brown; the pectoral fins are red at the top and bottom, but yellow in the middle; the ventral is entirely red; the head is shaded with brown; the whole fish is strongly phosphorescent. It is 6¾ inches long.

[r] *Smaris Royerii*. The upper or flat part of the head is curiously ornamented·

Linnæus[s]. Besides these I had the opportunity of determining the *coryphæna rotvacula*, *mullus surmuletus*, a *chætodon*[t], and a *zeus*, belonging to Cuvier's first division of that genus, but wanting the long filaments behind the dorsal spine of the *zeus faber*; and of a brilliant red colour[u]. A dead flying-fish was brought to me, which most resembled the *exocetus exiliens*, but differed from it in the length of the ventral fins, which, instead of reaching to the caudal, only extended to the middle of the anal; the proportionate size of the air-bladder was smaller than in other species, being only half the length of the fish, or seven inches by 0.3; the pectoral fins were 8½ inches long, and furnished with considerably larger nerves than the ventral. The fish having been some hours out of the water, it was impossible to determine whether there was an orifice at the anterior termination of the air-bladder or not[x]. All the fishes I have mentioned are very good eating,

Its native name denotes, that it is found in deep waters. The first dorsal has eleven spines; the second ten rays; the caudal twenty-four; the anal twelve; the ventral six, and one spine; and the pectoral sixteen rays. It is of a beautiful silvery colour, slightly tinged with a yellowish red; on the middle of the back it is of a brownish violet. Its length, with the muzzle extended, is 7½ inches.

[s] *Esox Sphyræna*. It is said to be eatable only in the autumn, having a coppery taste at other seasons.

[t] *Chætodon Leachii*; B. It has a broad row of small teeth in the upper and under jaw. The dorsal fin has nine spines and fifteen or sixteen rays; the caudal seventeen; the anal nine, and one spine; the ventral five rays and one spine; the pectorals sixteen rays; but all are so fleshy that it is difficult to reckon them. The preoperculum is slightly toothed at the angle, and the operculum bears a spine. It is in every respect coloured like a tench, with the addition of some confused light gray spots. The scales are small, and the dorsal line is very obscure. It is called *shern*.

[u] *Zeus Childrenii*, B.

[x] The length of this fish, from the end of the jaws to the fork of the caudal fin, is 14 inches, and to the tip of the lower lobe of the same fin 21½; the dorsal fin has twelve rays, and is 2½ inches long; the caudal has ten distinct rays on each outer side of the fork, and the intermediate space is filled up by a number of small fine rays; the anal (2½ inches long) has nine rays; the ventral (4½ inches long) has six, branching

except the *diodon*. The tunny (*scomber thynnus*) is also caught in abundance, and has been known to weigh 300lbs. The common eel is found in the torrents, or rivers as they are called; and the *muræna helena*, sometimes nearly three feet long, is caught in the *embouchures*, but the latter, so much prized by the ancients, who reared them for the table in ponds, is only eaten by the poorest class.—To this list may be added soles and *sardinhas*.

The *sepia octopodia* and *s. triangulata* were brought to me by the fishermen, as great curiosities. The *caracca*, fig. 6, a, b, is apparently a new genus of *cirrhopoda*, and seems to me to be the link between *balanus* and *coronula*; the mantle of the animal is the same as that of the *balanus*, but it has ten pair of cirri, with branchiæ appending; its shell approaches it to *b. tintinnabulum*. I should propose naming it *halosydna balanoidea*[y]. I also saw a beautiful new *pagurus*[z], and the *testuda caouana*, which makes excellent soup[a].

at the top; the pectorals (8½ inches long) have fifteen rays each, also branching at the top; its colour is a silvery gray.

[y] *Odyss.* δ 404. The shells are sessile in groups, and open at the upper extremity only, where they adhere to each other; the longitudinal ribs are strong, and the space between them is finely-striated across; the opening, closed with a four-valved operculum, is irregularly triangular; and the growth of the shell is visible within, as are also the cells; the testaceous plate lining the inside, only reaches half way down. The colour is generally of a purplish white.

[z] *Pagurus Maculatus*. It is of a reddish colour; the two first, or short articulations of the long antennæ (which measure 24½ inches) are prickly; the rings of the tail (which is not orbicular) bear white spots or streaks, which on the last ring form a cross, terminated by a ball; the cuirass measures 5½ inches, and the tail 7 inches.

[a] Cuvier writes "*la chair est mauvaise*," but the epicures who visit Madeira, pronounce the soup made from it to be excellent. The natives do not extract a lamp oil from it, as in the Mediterranean; the one I measured was 18 inches long and 12 broad. Perhaps it is a small variety of the *caouana*: the first, second, and fifth scales of the middle row have the heel much stronger than the others; the fore feet are longer, but scarcely narrower than those behind, and it bears a strong nail on the thumb and fore-finger of each foot. The fresh water tortoise (*emyss. Brong.*) of Madeira, is the *testudo scabra* of Schœpfer.

The mean temperature of Funchal, according to Kirwan, is 68.9 of Fahrenheit, or 20.4 of the centigrade thermometer; but I am inclined to think from the eighteen years observations of Dr. Gourlay, a resident in Madeira, that Kirwan's informants have led him to rate the mean nearly three degrees of Fahrenheit too high[b]; as he did that of the equator[c]. The difference in the

[b] Mean temperature of Funchal. Of Laguna 1834 feet above the sea but 4° nearer the Equator.

	Kirwan.	Gourlay.	Bowdich.	Savignon.
January	64°.18	61°	62°.3	55°
February	64.3	62	„	56
March	65.8	61	„	58
April	65.5	64	„	59
May	66.53	65	„	62
June	69.74	66	„	65
July	73.45	73	„	69
August	75.02	73	„	71
September	75.76	72	„	70
October	72.5	68	71.5	66
November	69.08	65	66.7	62
December	65.	64	63.8	58

Dr. Savignon, a Spanish physician resident at Laguna, adds to his MS. communication, "In a house about the centre of the city, the windows open, and a free current of air constantly running." The mean temperature of Santa Cruz, according to M. von Buch, is 21.8 C. (71¼ F.) or 4.5 C., higher than that of Laguna. I should mention, that the month of October of 1822 was said to be unusually warm in Madeira, where I arrived on the 12th: the mean of six observations at 6 a.m., was 69 F.; of 19 at 9 a.m., 70.5; of 6 at mid-day, 73; of 19 at 2, 73.9; of 18 at sunset, 71.5; of 4 at 11 p.m., 69.6; of 3 at 3 a.m., 66.1. In November, of 25 at 8 a.m., 66.9; of 18 at 2 p.m., 67.3; of 21 at sunset, 65.8. In December, of 27 at 8 a.m., 63.6; of 28 at 2 p.m., 64.5. In January, of 21 at 8 a.m., 61.7; of 16 at 2 p.m., 63.2; of 13 at sunset, 62.3. Baron de Humboldt has shewn, that the half sum of the temperatures at sunrise, and 2 p.m., differs only some tenths of a degree from the exact daily mean; and that the temperature at sun-set differs only in the same small quantity from the mean deducted from the observations at sunrise and 2 p.m.

[c] Humboldt, *Memoires d'Arceuil*, 5. p. 512. Much error must arise from travellers not comparing their instruments with a standard thermometer; of five which I bought at Pixii's, M. Arago found but one exact, and in two I had to allow for an error of 1°.5 R.

mean temperature of several years scarcely ever exceeds 1° of Fahrenheit in Madeira; and the difference between the means of February and August, which may be considered as the extremes of heat and cold, averages 10°. The mean temperature of Lisbon, according to Lieutenant-Colonel Franzini's observations for 1816 and 1817[d], is 60.2 and the difference between the means of January and July, 21°.5 F. This difference in the mean temperatures of Lisbon and Madeira gives 5°.3 F. for 6° of latitude, or 9° F. for the 10° between the parallels of 30° and 40°; being 1°.7 more than the allowance of Baron de Humboldt: but if we admit Kirwan's mean temperature, this variation from Humboldt's conclusions will amount to an excess of 3°.7 and almost equal the difference between those parallels in the new continent.

"A Funchal la temperature des caves parait être de 16°.2 C. (61° F.), par consequent, de 4° C. (7°.9 F.) au dessous de la temperature de l'air. Nous reviendrons dans la suite sur cette difference remarquable entre les souterrains à l'isle de Madere et l'atmosphere circonvoisine[e]." I think I may venture to contradict this anomalous difference. There is not a subterraneous cellar, or crypt, in the island: the deepest caverns, are the "Furnaces of St. John," (close to Funchal on the N.W., and about 240 feet above the sea) formed out of a deep bed of *scoriæ*. In the largest, (128 feet to the inmost part, which is wide, spacious, and lofty, and about fifteen feet below the level of the mouth) I made the following observations: November, 4th, 1 p.m., temperature of air 71°.5; hygrometer 51°; temperature of the inmost part of the cavern, 67°; hygrometer 73⅓°. January 4th, 2 p.m., temperature of air 66°; just within the mouth, 64°; inmost part, 63½°. Again, in

[d] *Observaçoes Meteorologica Feitas na Cidade de Lisboa, no anno de* 1816 *e* 1817, *Offerecidas a'Reale Academia dos Scienceas*, p. 123, 727.

[e] HUMBOLDT, *Annales de Chimie*, p. 602. *Rel. Hist.* p. 424, qto. I quote from my MS. extracts from these expensive works, and have omitted to note the volume.

the cavern at Praya Formosa, close to the sea, about three miles west of Funchal, and upwards of thirty feet deep, I found a difference of only 3° F. and in that of St. Roque, about 1000 feet above the sea, north of Funchal, and nearly sixty feet deep, a difference of only 4° F.

There is an extraordinary difference, however, between the temperature of the wells and that of the air of Funchal; the former (Mr. Lundie's, Mr. Young's, and Mr. Serle's, all upwards of twenty feet deep and in the open air) being 58° when the latter was 69°—but this is explained by recollecting, that these wells are supplied by streams which descend from heights of 3800 feet behind the town, where there would be a corresponding difference in the mean temperature; for that of the spring near the Mount Church, (enclosed at the expense of Consul Murray) and about 1900 feet above the wells in question, was 58°, the air within being 62°, by an observation which I made in October. The observations on the Peak of Ruivo gave eighty-nine toizes to a centigrade degree, for the decrease of temperature; those on the brink of the Coural, at the point of view from which the drawing was made, ninety-five toises; those at the Mount Church, ninety-eight toises; the two latter results are probably in excess, from the elevations being backed by greater height, and not at all insulated. I have calculated in toises, merely because the results of De Humboldt's and De Saussure's observations are given in this measure. When at Arieiro, a cold north wind came on to blow suddenly, and lowered the thermometer so considerably for the time, that I could make no conclusions; and the locality of Mr. Veitch's quinta is such, from the torrents adjoining it on each side, that it is much colder, as a particular spot, than the country about it, and at the same height above the sea. November seems to be the month whose mean temperature is the closest approximation to that of the year in these regions.

The mean of thirty-eight observations in the month of November in Funchal, 154 feet above the sea, at 8½ a.m. 2 p.m. and sunset, by Leslie's hygrometer was 3.2; of 41 by de Saussure's, 65.1; of 24 observations in December, by Leslie, 3.1; of 37 by De Saussure, 75.3; of 31 by De Saussure in January, 83.3. During a very strong wind in the month of November De Saussure's fell from 71 to 50 within five hours: its maximum of dryness during my observations was 41° (in the morning of the 22d of November) the thermometer being at 19 C. or 66,2 F., and a correspondent observation with Leslie's hygrometer giving 5.3[f]. De Saussure's stood at 57° on the Peak of Ruivo, before the clouds had ascended, the thermometer being at 49 F., at which time (10. a.m.) Leslie's descended to 2.4 at Funchal, (equal to 85° of De Saussure's, from a comparison of numerous coincident observations,) the thermometer being at 68¼°: now if we reduce the former observation to the same temperature as the latter, taking the results of the experiments of De Saussure for ascertaining the weight of moisture contained in the air at different degrees of the thermometer and hygrometer, for the data of our calculation[g], the 57° of Ruivo becomes 46¾° which gives but 162 feet to each degree for the decrease of humidity in this region[h]. Snow descends in Madeira

[f] Lieutenant Colonel Franzini informed me, that no hygrometrical observations had been made in Lisbon. I made the following, during my stay there in September: 8. a.m. mean of 21, Saussure, 71.3; of 19, Leslie, 3.7; of 19, Thermometer 71. F.; 2. p.m. mean of 19, S. 61; of 20, L. 6; of 18 Thermometer 75.6: 9. p.m. mean of 17, S. 67: of 16, L. 5.6; of 16 Thermometer 71.8. The minimum of my observations was 23.5 S. a corresponding observation of Leslie giving 11¼; Temperature 80¼, September 4th, at 2. p.m.

[g] *Essais sur l'Hygrometrie.* Neuchatel, 1783. p. 181.

[h] I endeavoured to procure De Saussure's cyanometer through professor Pictet, but unsuccessfully, the inventor's standard being lost; the accurate degradation of blue over the whole circumference of the apparatus, and the absolute similarity of the tint or shade of a given division of the copy with that of the same number in the original,

to 2500 feet. De Humboldt states 9800 feet, as the least height at which snow falls in the parallel of 20° N. The first snow fell on the 16th of December.

The mean of 42 observations at 8.5 a.m. 2 p.m. and sunset, by Fortin's barometer (which had been compared for several weeks, with that in the observatory at Paris) was 767.30. of 43, in December 764.22, of 31, in January 761.60; in a turret 154 feet above the level of the sea. As far as I could judge, from a short series of observations during the more settled days of October, the maximum corresponds to 8½ a.m., and the minimum to 3, p.m. in Madeira.

I do not think the mean of the annual quantity of rain which falls at Madeira, can be far short of forty inches. I determined the quantity which fell in January by a series of observations with a roofed pluviometer, so as to prevent any loss by evaporation, and it amounted to 13.2 inches. The heaviest rain was on the 24th, 0.96 of an inch in five hours[1]. According to Dr. Savignon, 19.33 inches, fell at Laguna in Teneriffe in 1812, and 25.22 inches in 1813: if this be correct, the increase from 45° N (where 24½ E inches is considered to be the mean annual quantity), to 28° N, would seem to be in a lesser proportion than from 28° N to 19° N,

were consequently impossible, as well as indispensible conditions. But it was well known, that the class of observations to which the instrument was destined, was not considered by De Saussure as an important and conclusive source of atmospherical results; the colour and depth of the blue of the heavens being so far influenced by the pressure of the least quantity of vesicular vapour, that nothing certain or absolute could be concluded from its estimate, by a comparison with the slowly degrading shades of the circular divided zone which constituted the instrument, to say nothing of the difficulty of determining by observation, to which of its divisions the blue of the heavens exactly corresponded.

[1] 31. 5 inches of rain fell in Lisbon in 1816, and 21. 4 in 1817, the palma or 8. P. inches being equal to 8. 9 English; but 1816 was considered an extraordinary year in this respect by the inhabitants. *Franzini*, b.c. p. 28, 123.

where 71 E inches is the computed quantity[k]. The rainy season of Madeira may be said to comprehend the months of October, November, December, and January, although the intervals of fair weather, during the two former months, generally exceed the periods of rain. This season is ushered in by the cessation of the north-east breeze, frequent calms, a prevalence of westerly

[k] In October, 1809, there was a very disastrous flood in Madeira. There had been no rain for several months, and the rivers or torrents were almost dry. The rain did not begin before mid-day, continued incessantly, and at eight o'clock the torrents came down, swept away all the bridges, but one (on which the surveyor had built his own house), and carried away several houses, with the inhabitants in them, vainly imploring relief from the windows; the lower parts being full of water, it was impossible to force the doors, and before ladders could be applied, the houses went to pieces, and the unfortunate people were lost. One house was carried into the sea, and seen there entire for some minutes, with the lights in the upper windows. According to the confession-lists of the priests, not more than 300 persons were lost, but as the principal mischief happened in a quarter of the town inhabited by sailors (among whom were a great many foreigners, it being war time) and prostitutes, who were never on the confession-lists, the total loss of lives must have been upwards of 400. The streets were choked with ruins and heaps of dead oxen, sheep, and domestic animals: the church doors were blockaded with bodies, laid there to be owned, and accumulating as they cleared the streets; some apparently retaining sparks of life, but neglected and allowed to expire in the general panic and bustle. They were all burned afterwards, and all the pitch and tar put in requisition to fumigate the streets by bonfires. It is said to have been scarcely less distressing to view the despondence which for days pervaded almost the whole of the lower classes; they believed it was the end of the world, and would make no exertion, but remained like statues until roused by the renewal of the rain, when they ran from their houses; some rushing through the crowd with torches, others rolling over each other in the darkness of the night, many returning in despair, unable to find a retreat. The peasantry flocked to Funchal, thinking the calamity had been confined to the country, and met the flying townspeople on their way. One good, however, resulted, for the quantity of earth carried into the sea diminished the soundings and anchorage of the harbour several fathoms. From the breaking up and transport of large pieces of ground in the interior, it would seem, that a water-spout had burst there, caused probably, by two contrary currents of air giving a rotatory motion to the mass of air which separated them.

winds at first, and of south and south-west, sometimes amounting to gales, afterwards. Thus, although situated within the temperate zone, and therefore subjected to a far greater number of perturbing causes, yet from the vicinity of Madeira to the tropic, we are enabled to recognise the influence of the same laws which regulate the setting in of this season in the regions of the torrid zone. It has been submitted by one of the first authorities on these subjects, that while the north-east breeze prevails, it prevents the air, which reposes on the equinoctial seas and regions, from being saturated with humidity; the ascending current of heated and humid air being regularly replaced below, by dryer and cooler currents, from the north: but when this breeze ceases, the columns of air are no longer displaced or renewed, and, consequently, the humidity is accumulated to saturation. The north-east breeze being created by the difference of temperature between adjoining regions, abates of course in proportion as that difference of temperature diminishes; now the month in which the temperature of Madeira differs least from that of the region or band of 50° N, is September, at the end of which the first rains and westerly winds generally occur. It does not appear to me, however, that the rainy season of the northern equinoctial regions ought to occur at the time of the sun's passing the zenith of the different places, as De Humboldt considers; for surely there will be the least difference between the temperature of the northern and the equatorial regions when the sun is nearest to the former, and the most distant in northern declination from the latter. Accordingly, we find that the rains commence at Cape Coast, and Sierra Leone, not in the beginning of April or September, when the sun passes the zenith of these places, but towards the end of June, when it has reached the northern tropic. Being but 150 feet above the sea, when I made my observations, the lower regions of the air were slightly charged with electricity, that I could not discover

any sensible quantity, although I frequently tried, (soon after sunrise as well as at less favourable hours) until January, when during a violent storm from the north-west, the straws of Volta's electrometer (armed with a conductor of thirteen inches), diverged 1.5 lines with negative electricity. Before this, I had frequently tried with a small condensator adapted to the instrument, but not successfully.

The Sirocco is experienced here in a slight degree, and always arrives from the eastward. From Cape Verde to Cape Palmas, its direction, under the name of Harmattan, is north east; but from the latter place to Benin, E.N.E. In Egypt, it is called Kamsin, and blows from the S.S.W. The dim troubled appearance of the sun and sky, the fine dust pervading the air, the dryness of the skin (especially that of the lips and nose, as if affected by a severe cold), the curling up of books, and papers, and the wide gaping of the seams of all boarded floors, are the attendant circumstances both of the Harmattan and Kamsin; but I never heard of people dying from the effects of the former, that is, from a difficulty of respiration, attended by convulsions, and the rushing of the blood to the head, followed by bleeding at the mouth and nose after death, as M. Volney witnessed during the Kamsin[1]. On the contrary, our invalids always became convalescent, and there are most extraordinary instances on record at Cape Coast Castle, of Europeans who lay at the point of death, being gradually resuscitated by the setting in of a Harmattan. The natives look and feel very uncomfortable whilst it lasts, which is generally about three days, but I do not recollect that they are particularly anxious to avoid stirring out, as in Egypt, where they even shelter themselves in the wells, according to Volney: neither do I recollect that dead bodies swell, become blue, and are easily torn, as he describes. I remember to have heard on good authority, that 300 slaves were inoculated for the small pox, by the

[1] *Etat Physique de l'Egypte*, p. 50.

surgeon of a ship at Whydah, during the Harmattan, without a single individual taking it, although they all sickened of it when the inoculation was repeated on the cessation of this wind. The Kamsin is called the "hot wind" in Egypt, and in Madeira (where it is called the Sirocco by the British, and Leste by the Portuguese) it sometimes raises the thermometer to 90° in the shade; but on the Gold Coast, if I recollect right, it lowers the thermometer from 5 to 10 degrees. The easterly current from Cape Palmas is always reversed during the Harmattan, and I have known a vessel run up from Cape Coast to Sierra Leone in five days, by taking advantage of this circumstance; it generally takes from three weeks to a month to beat up there. I feel impatient for the opportunity of making some hygrometrical observations during the Harmattan, and propose to ascertain the positive quantity of humidity contained in the air at that time, by means of a doubly-graduated tube and a trough of mercury, allowing a small quantity of air to enter at the tube, after the mercury within it has been gradually raised to ebullition, noticing the quantity of air by the great scale of the tube, and the height of the mercury by the lesser, observing the barometer and thermometer, calculating the volume of air contained; afterwards introducing a drop of water to saturate it, calculating its volume at the temperature of the atmosphere, and with it, that of the air perfectly dry, deducting it from the volume found in the first instance, and calculating the weight of moisture contained in the residue. This strikes me to be the surest method, when the occasion is too interesting to depend on the mere comparative indication of hygrometers.

The insufficiency of my means would have entirely deprived me of instruments for the more interesting magnetic observations[m],

[m] La physique y pourra enfin obtenir aussi les lois de la distribution du magnétisme terrestre, dont, partout l'intérieur de l'Afrique, on n'a pas la moindre notion; elle y trouvera encore des données météorologiques d'un interêt extrême.—Biot *(Review of the Mission to Ashantee)*, *Journal des Savans*, Août.

being the most expensive of any[n], had not M. Arago kindly presented me with the simple apparatus which he used at Dunkirk; viz., a needle with an ivory scale affixed to the end of it, covered by a glazed box, to prevent its being agitated by any current of air, and suspended carefully by a piece of fine silk, free from torsion, and descending through a hollow piece of cane, with a microscope with intersecting wires for the reading of the finely-graduated scale. The observations may be calculated, when necessary to compare them with those of any other instrument, by noting, that the distance from the point of suspension to the scale is 12.95 centimetres, and that each line of the scale is equal to 0.25 of a millimetre: for, by dividing the former quantity by that of the daily movement, the quotient will be the tangent of the daily variation in minutes. The results of my observations[o] at Madeira are, that the greatest variation is at 8 a.m. and the least at 2 p.m.; and that the variation decreases with the temperature, being least in the coldest season. I hope to make a more regular series of observations and under more favourable circumstances at[p]

[n] Gambey, who furnished Mr. Ritchie's, asked me from 1500 to 2000 francs.

[o] Movement from 8 a.m., to 2 p.m., to 6 p.m., from 6 p.m., to 8 a.m.

	lines	lines	lines
October 22—23	1.83 west	.9 east	.1 east
23	.9 „	.5 „	
24—25	1.08 „	.75 „	.4 „
25	.8 „	.5 „	
26—27		.4 „	.9 „
27	1.3 „	1.2 „	

from 8 a.m., to 2 p.m. October 28th, 1½ W. 29th, 1½ W. 30th, 1½ W. 31st, 1½ W. November 1, 1½ W. 4th, 1½ W. 6th, 1 W. 13th, 1 W. 14th, ½ W. 15th, ½ W. 16th, ½ W. 18th, 1½ W. 19th, 1½ W. 20th, 1½ W. 21st, ½ W. 22nd, ½ W. 25th, ½ W. 26th, ½ W. 27th, ½ W. December 5th, ½ W. 6th, ½ W. 7th, ½ W. 14th, 1 W. 16th, ½ W. 17th, ½ W. 20th, 1 W. 28th, ½ W.

[p] 1701 Coetlogon, 4° W. 1720 Laval, 8° 15′ W. 1758 Howe, 15° 12′ W. 1761 Bishop, 16° W. 1769 Fleurieu, 15° W. H. M. S. Lowestoff, 16° 30′ W. 1788 Johnston, 18° W.

Cape Coast or Sierra Leone. I made the variation 22° 17′ W. I could only afford to furnish myself with Kater's pocket azimuth compass for this observation, but I took the precaution to determine its error (2°) at the observatory. The azimuth circle at the foot of my reflecting circle, having a nonius by which it may be read within a minute, I preferred bringing down and determining the distance of the sun from any remarkable object in the horizon at each observation, and bearing that object leisurely afterwards, to bearing the sun itself at each observation, having no assistant, and the compass being graduated only to degrees.

I had the reflecting circle made, to use occasionally on a foot, like a repeating circle with a moveable level, to obviate the inconvenience of being unable to take meridian, or indeed double altitudes of the sun, with an instrument of reflection in those parts of the interior of Africa approaching the equator, since in using the artificial horizon, the sextant will not measure an altitude exceeding 60°. It is rather hard upon a traveller to be obliged to keep awake to watch the culmination of a star, after being worn out by a hard day's march. Baron de Humboldt proposes placing the index glass at an angle, say 30°, to the false horizon glass[q], which I have done to an old wooden sextant which I keep in reserve; but I do not see how it is to be rectified from time to time in a close inland country, where the whole circle of the horizon is rarely visible, unless by another instrument. Mr. Beauchamps[r] submits the plan of inclining a glass 45°, on the artificial horizon, which would enable the observer to measure the greatest possible attitude, but I confess I do not immediately see how the angle of inclination could be verified from time to time with facility; and it must always be recollected that measuring the meridian or correspondent altitude of a star by means of an

[q] *Voyage Partie Astronomique*, 2 vol. 4to. vol. I. p. 9.
[r] *Memoires sur l'Egypt*, t. II. p. 109.

artificial horizon, can never be a very nice observation, unless a man be blessed with the tact of De Humboldt. The difficulty of not seeing the hairs of the telescope of the circle when a star was brought within the field, and the inconvenience of affixing a lamp, is remedied by making the horizontal hair sufficiently thick to eclipse the star when brought behind it. This instrument, and a telescope for eclipses and occultations, I am proud to say, I owe to the generous interest of my friends in the University of Cambridge. I made the Consul's house in Funchal 32° 38′ 22″ N. and 16° 53′ 34″ W. by the mean of several lunar distances. Unfortunately I could not afford a chronometer, but this inconvenience may in some degree be obviated at the expense of time and labour, as I hope to prove in my next publication. It is but prudent, however, to wish, and endeavour to be as sparing as possible of both, when travelling in the interior of Africa. "Lorsqu'un gouvernement ordonne une de ces expéditions qui contribuent à la connaissance exacte du globe, et à l'avancement des sciences physiques, rien ne s'oppose à l'exécution de ses desseins. Il n'en est pas de même, lorsqu'un simple particulier entreprend à ses frais, un voyage dans l'interieur d'un continent[a]."

[a] De Humboldt, *Voyage*, vol. 1, 8vo. p. 63, 64.

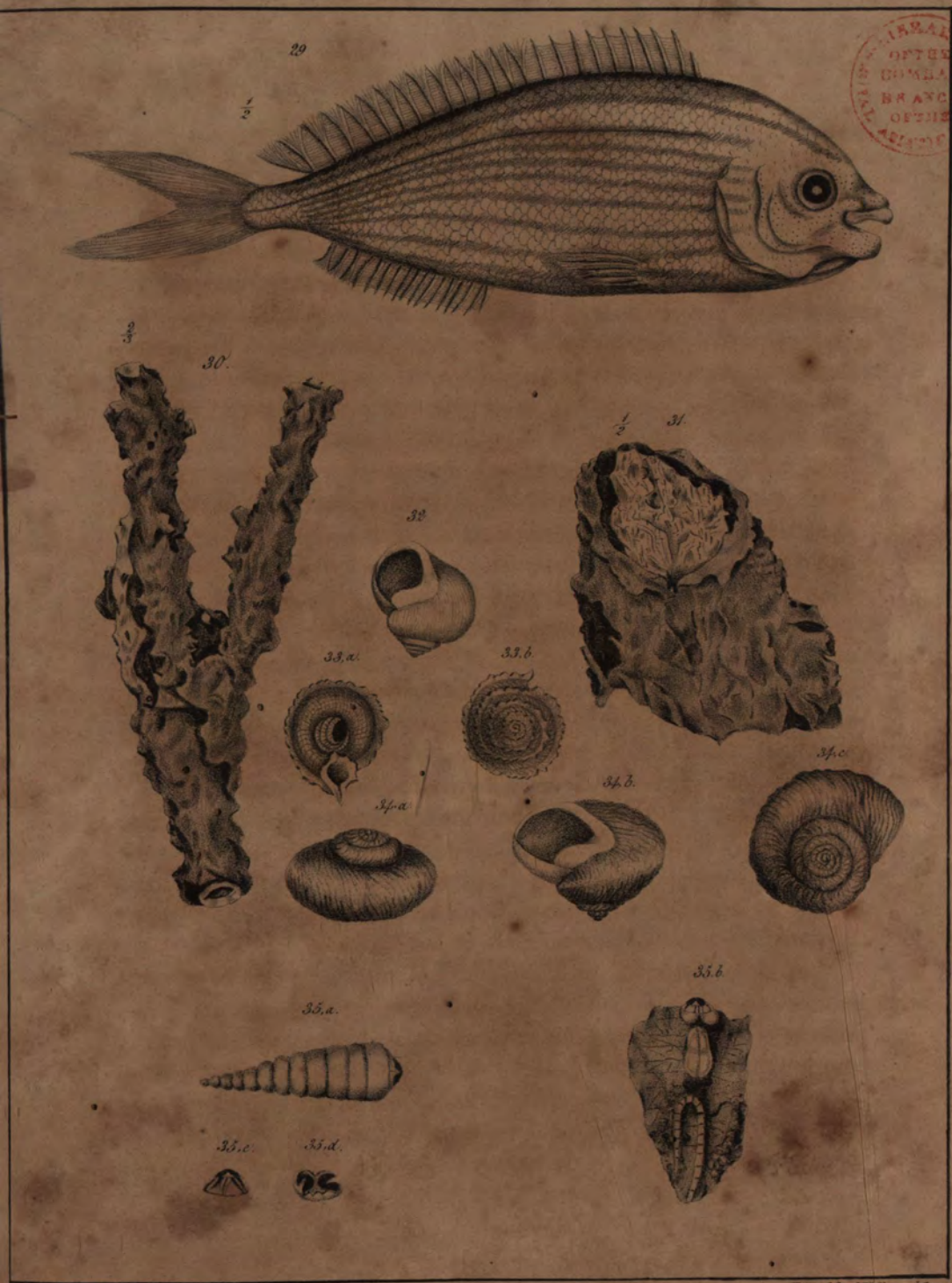
SUPPLEMENT.

HAVING unexpectedly procured a letter to the Vicar of Caniçal, about fifteen miles from Funchal, and the last village towards the eastern end of the island, from which it is not much more than three miles distant, I hastened to explore its eastern environs. I quitted Funchal at half past three in the morning, but did not arrive at Caniçal until mid-day, having been detained at Machico. It is a small and scattered assemblage of miserable huts, like a Hottentot kraal, into which the inhabitants seem to creep for shelter rather than comfort. I surprised the good vicar intent on his only book, the *Filosofia moral*, in a small but dry room, tacked on to the church, and reached by a flight of steps, as if it were the belfry. He received me very kindly, covered his little table with excellent bread and cheese, wines, and marmalade, and ordered an intelligent, active lad to accompany me in my ramble towards Porto Lourenço.

We had followed a rough track, on the margin of shallow cliffs of alternations of tufa and basalt, for about a mile and a half, when we reached a depression, more like a basin than a plain, covered with a deep bed of loose and agglutinated sand. These sands have in some degree been fixed or bound by the numerous branches of forest-trees which they have enveloped, for these branches (which have preserved their lateral twigs) are so numerous, that

they are spread over the surface, like a network of stoloniferous roots. It is scarcely possible to set the foot on the ground without treading on them. Both the branches and the trunks (which stand on their roots in their natural position) are encased in a thick, hard sheath of agglutinated sand, which has followed the external configuration of the wood, like a cast. In some instances the wood has entirely perished, and the envelopes are found void like tubes, but most frequently the wood is found within, as a distinct mass, and has become sufficiently siliceous to scratch arragonite. V. fig. 30 and 31. The tallest fragments of trunks reach about a foot above the surface of the sand; how far beneath it I cannot say: there were two of these as thick as my body. Sometimes imbedded in the envelopes of the wood, but generally in the looser sand of the surface, were innumerable fossil-shells, intermingled promiscuously; two species terrestrial, the third belonging to a marine genus.

The *delphinula*, fig. 33 a, b, approaches the *d. sulcata* of Lamarck, only known in the fossil state, and found at Grignon. Both *helices* belong to the group *lamellatæ* of De Ferrussac's sub-genus *helicostyla*. The smaller species, fig. 32, is globose; but the larger, fig. 34, a,b,c, (which is one inch and a quarter in its greatest diameter, and $\frac{1}{10}$ths deep) has the last whorl compressed, or flattened. There are several *helices* still smaller than the former, with the umbilicus exposed; but this is merely because the plate which covers the columella is not entirely developed, and I have not the least doubt of their being young shells of the first-mentioned species. These shells are perfectly distinct from the existing *helices* of Madeira, which I have already figured or described, and there is not one to be found in this neighbourhood. All the branches and wood appear to belong to the same sort of tree (of which there seems to have been a small forest on that spot), and that evidently a *dicotyledon*, but more than this



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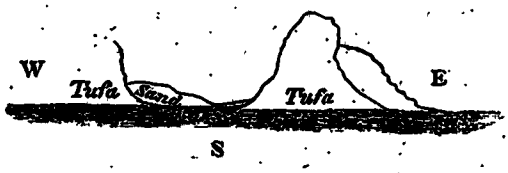
I do not think our present knowledge of the comparative anatomy of timbers is sufficiently advanced to determine[1]. The sand is calcareous, whether from the destruction of fragments of the transition limestone (found beneath the basalt at St. Vicente) in the bed of the ocean, or from comminuted shells, I will not venture to pronounce, although I incline to the former opinion. The carbonate of lime in the sheaths or envelopes of the wood, bears a greater proportion to the silex than in our common mortar, than which their substance is much harder; for estimating it by the difference of weight after the escape of the gas, it amounted to 43 per cent. There is much ferruginous sand, mixed with that thus thrown up, resulting from the destruction of the masses of red tufa constantly falling from the cliffs into the sea. On the western limit of this local deposit, are large globules of basalt (which from their concentric form and other appearances have evidently been in a fluid state), laying loose upon the soil, from the tufa (in which they are still found imbedded at greater heights) having been washed away from them. On such a soil the vegetation must be wretched; a *mesembryanthemum* and an *orobus* were the only plants that existed, or rather languished there.

Having described this locality to the best of my ability, I leave abler geologists to draw the conclusions; but perhaps I may be allowed to submit:—First, that it has evidently been an *irruption* of the sea, from the heaps of *terrestrial* shells mingled with the marine, and from the trees being found standing on their roots, and not deposited promiscuously in detached fragments, or flattened, as they would be, had they been transported thither, or had they been subjected to any pressure of a superincumbent stratum, afterwards removed. Secondly, it is clear that this must have happened after the Atlantic had lost that considerably higher

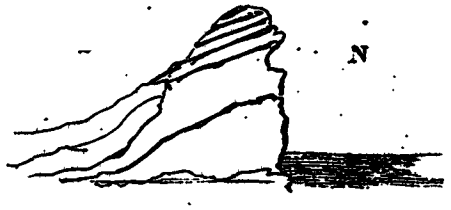
[1] Specimens of these lignites have been sent to the Geological Society.

level which the oysters, and marine shells, found 300 miles inland in the blue mountains of America, would seem to indicate; for the deposit (extending about three-quarters of a mile in each direction) is bounded by hills and small peaks, rising several hundred feet above it, composed of the same tufa on which the sand and shells are deposited, and in the soil of which this small forest must have been growing, thus; which peaks and elevations present



no traces of sand on their surface, or elsewhere, above the highest level of that in the flat, *i. e.*, above 250 feet or thereabouts. Seeking for that explanation which rests on the fewest and the simplest causes, it occurred to me, when I first reached this bed of sand, (which was on the southern side, where it is level with the water's edge) that there might have been no irruption or elevation of the level of the sea, but a subsidence of the tufa strata (like that of the shores of Alexandria, which, according to Dolomieu are a foot lower than they were in the time of the Ptolemies), the natural consequence of gravity, or one of those slips so frequently evident along the coast, which led to a deposit of calcareous sand on the border of the sea,—which sand, from its extremely fine grain, was readily dispersed by the winds, until it reached the north side of the island (for it is barely three-quarters of a mile broad on this part), where the drift line of the sand, with the tufa on which it rests, is about fifty feet above the sea. But then, should we find the marine shells in such heaps at the height of 250 feet?—would the sand have been so firmly agglutinated, as it is in the indurated sheaths which envelope the trunks and branches of the trees?—and could there be a regular, or dip line

descending S. 30. E.? I cannot help thinking, that there must have been an irruption of the sea from the northward, covering both this small flat, and that already described in Porto Santo, (where a marine shell, an ampullina*, is also intermixed with the *helices*) and depositing the bed of sand on both. However, I have performed the most important part of my duty by particularizing the fact as well as I am able, and will therefore say no more. The high cliffs on the north side of this part of the island, behind Caniçal, are broken off abruptly in their whole depth towards the sea, and present numerous dip lines of strata, deeply inclined to the southward, from these broken faces; thus, as if a considerable



part of the island had been broken off or worn away on that side, which would also seem to have been formed from a crater now lost in the ocean, to the northward.

I took leave of the worthy vicar with some regret, his reception had been so cordial, and his manners were so frank, and his hospitality so cheerful. It is painful, after being surprised by meeting an agreeable or estimable character in a barren and almost uninhabited corner of the world, to leave him without some proof of respect, and without the smallest chance of future intercourse. He had been twenty-three years in this miserable spot, without preferment, or recompense beyond his own conscience, and still remained without the hope or prospect of either.

* In addition to the fossil shells, which I found in the limestone at Baxo, I have now to mention the mould of a *spondylus*, and the upper valve of a *lima*.

Between Canical and Machico are frequent vertical surfaces of alternations of tufa and basalt, from 300 to 500 feet high, and ribbed by longitudinal dikes, sometimes bifurcated downwards, but never upwards. Close to the little bay of Machico there is a grand slip from the eastward of 45°. I had been compelled to put into Machico in my way to Canical, to see the Portuguese gentleman who gave me the letter to the vicar. He was evidently the chief proprietor, as well as the chief magistrate of the place, and seemed to live in a sort of slovenly plentifulness. His house was comfortable, and the room I saw tolerably clean; but in the passage or small hall, there was a handsome lamp, (certainly the only one out of Funchal) the glass covered within with accumulated stalactites of grease, and a miserable tallow-candle, about the size of a rush-light, half burnt, and leaning out of the socket against the glass. A good humoured, but dirty female servant, of square dimensions, received me without stays or handkerchief, her brawny brown back crossed by the strings, but not covered by the body of her gown; and the valet, an old dwarf, followed wherever he went by two or three mongrel puppies, waited on us without shirt or shoes, leaving his blue cloth jacket half open for coolness' sake. The master (who seemed an excellent tempered man, and who decided lots of disputes and complaints during the two hours of my stay, his door being actually besieged by petitioners) pressed me to stay to breakfast in so obliging a manner that I could not refuse, and after an hour's preparation, I was regaled with excellent green tea, hung beef, fresh eggs, bread and butter, and Lisbon sweet cakes and biscuits in a fossil state. As I sat at the window during the din of preparation, "sighing my soul out to Canical," where I feared to arrive too late in the day, and contemplating the picturesque peaks which frown upon the burial-place of the unfortunate Anna, I

T.E. Bowditch del. S. Bowditch lithog.

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could not help regretting, that the poet had chosen the pine to wave over her tomb [x], for although now

"Tiene il cipresso qualche uccel' secreto;
E con venti combatte il pin robusto [y];"

yet the latter is not indigenous to Madeira, and has even been introduced within the memory of persons now living.

I made a second excursion to Pico Ariero, and sketched the extraordinary view, of which I could not get even a glimpse in my first visit. I did this, not merely from its picturesque nature, but to furnish the geologist with the outline which characterizes these peaks of basalt and tufa, and to record the names of the peaks for future travellers, PL. 8 A. I have also added another sketch, PL. 8 B, which I made at the point where we begin the descent into the Coural (when visited from the Jardin da Serra), for the same reasons. The deeply-inclined ledges of the highest part of Sidrao (which is composed of red tufa with dykes) have a very extraordinary appearance. It bears W. 34° S., Ruivo W. 2° S., and the highest point of the Torrinhas, W. 11° N., variation allowed. I descended from Ariero about fifty feet below, and about 1450 feet south of the summit, to get a reflection of the Torrinhas in the artificial horizon, and in so doing shut out the two highest points; the third highest subtended an angle of 2° 21′, which, the horizontal distance from Ariero to the Torrinhas being 750 P. braças, or 5490 E. feet, gives about 5670 feet for the height above the sea. The horizontal distance from Ariero to Ruivo is 8166 feet. The highest point of Sidrao must be

[x] But Angels, as the high pines wave,
Their half heard "miserere" sing.
Bowles' *Spirit of Discovery*, p. 156.

[y] Poesie di Lorenzo de Medici.

about 5500 feet. I used a pocket sextant of Carey's, which reads only to two minutes. I was disappointed in repeating my barometrical measurement of Ariero, having rode a kicking mule there, and the small end of the tube being broken in consequence. I am sure, however, it must be quite as high as I made it before, 5446 feet. The Ice-house Peak must also be within 100 feet as high. It subtends an angle of 10°. 41'. 45" from a room about 150 feet above the sea, in Mr. Keir's house at Funchal, from which it bears N. 11°. W. Ariero bears about N. 12°. W., from the ice-house peak, and the horizontal distance between the two is only 4240 feet.

My companion to Ariero, Mr. Dunn, having formed a walking party with two other residents to Pico Ruivo, I put a new tube to my barometer, boiling the mercury both in the small glass retort and in the tube, according to the lessons old Fortin gave me, and finding it accord with its former elevations at the different hours of the day in the same room, and under the same meteorological circumstances, I confided it to the above-mentioned gentleman, with the necessary instructions, and he made an observation on Ruivo, which, with the accompanying one at Funchal with a barometer recommended me by Baron de Humboldt, gave 6118 for its height, or 46 feet less than mine. Using the crystal horizon, spirit level, and proof telescope on the Pico Ruivo, the thread of the latter cuts the heavens in every direction, without the intervention of any other peak, and the Torrinhas, bearing east, which Von Buch made 5857 feet by barometrical measurement, is only 3772 feet distant horizontally from Ruivo. I have every reason therefore to feel some confidence in my barometrical measurement of the latter, the heights ascribed to which have varied strangely, and are as follows:

Gourlay[a]	8250
Encyclopedia[a]	5068½
Smith[b]	5162
Sabine[c]	5438
Bowdich	6164

I am *told* that Lieutenant Vidal, of the Leven surveying ship, made it either 5964 or 5946 feet above the Consul's garden, which would make it more than 6000 feet above the sea, and that Mr. Johnstone, who published the map of Madeira, made it about 6000 also: Dr. Heberden merely says, that it is 3170 feet above the plain which environs its base[d]. The highest point of Madeira is so rarely seen by vessels at sea, that those not touching at the island could seldom avail themselves of the exact knowledge of its height for the correction of their longitude; and a more serious error to them, in frequently making but the east or west point of the island, is the erroneous length which has been ascribed to it. In the 7th, and I presume the last edition of Guthrie's geography,

[a] *Observations on the Natural History, Climate, and Diseases of Madeira*, London, 1811, p. 6. The Doctor's knowledge of Natural History, which has not enabled him to determine a single rock, mineral, bird, fish, or plant, in this then wholly unexamined island, is confined to such remarks as "mutton is not so much cultivated here as it ought," p. 24, and the like. The Doctor, however, has given a very patient and useful meteorological register (continued for eighteen years), which his editor ought not to have taken the liberty to crop short. Dr. Pitta (*Account of the Island of Madeira*, London, 1812), who, for so amiable a man, dwells rather ill-naturedly I think on Dr. Gourlay's, or rather Dr. Gourlay's printer's inadvertence, "I prescribed *for* a raw lizard every morning," tells us p. 78, "of *shell fish*, the lobster, crab periwinkle, shrimp, and *lamprey*, abound here," but then to be sure he does not promise *Natural History* in his title page.

[a] I have omitted to note, but I am pretty sure it was the *Encyc. Londinensis*, from which I extracted this height before I left Europe.

[b] *Tour of the Continent*, vol. 1, p. 200. *Irish Transactions*, vol. 8, p. 124.

[c] *An Account of a Barometrical Measurement of the Height of the Pico Ruivo*, by Captain Sabine. *Journal of Science*, No. 29.

[d] Humboldt's *Voyage*, &c. l. 1, c. 1. Cook's *First Voyage*, t. 1, p. 272.

published in 1811[e], we are told, that Madeira is 75 miles long, and 60 broad; now the extreme length, as I have shewn from Colonel Paulo d'Almeida's survey, is only 32½ G. miles, and the greatest breadth 12.1. I have taken as much pains as possible to ascertain the latitude and longitude of the eastern and western points, by combining the best existing data, and I make the former, P. Lourenço, 32° 43′ 30″ N., 16° 39′ 22″ W.; and the latter, P. de Pargo, 32° 50′ N., and 17° 22′ W.[f]

I have determined five more indigenous, and two more cultivated plants, to add to the sketch of a Flora in the Appendix. Of the former, the *asclepias fruticosa* is found in different parts of the island, the *senecio triflorus* towards the bottom of the Coural, the *sedum divaricatum*, *stachys scordioidis* and an *orchis* (an *iberica?*) in the laurel region of the ascent to Ruivo. The latter are the *momordica balsamina* in the garden of Mr. Keir, and the beautiful *inga obtusifolia* (first found in Cumana, by De Humboldt and Bonpland), in that of Mr. Wardrop.

All the branches of several orange-trees at the Valle villa, near Funchal, having unaccountably perished, they were cut down, and a section of one being accidentally made at the very line which separated the healthy from the diseased part of the tree, a worm was found near the centre, lodged within a perforation (1½ inches long, ½ inch wide, and 2 in depth, narrowing inwards), which it was occupied in enlarging by means of its powerful jaws (the working of which produced an irregular noise equal to the ticking

[e] *London*, 4to. p. 841.—Gourlay writes, p. 5, "its greatest length from east to west is 45 miles;" Pitta, p. 10, 55 miles.

[f] Since the sending home of the manuscript of this work, Mr. Bowdich, who never lost any opportunity of pursuing his scientific observations, was enabled, with great labour, to effect a trigonometrical measurement of Ruivo, &c., which has been published in BREWSTER's *Scientific Journal*. ED.

of a large clock), devouring the wood, and clogging up the aperture behind it with *compressed* saw-dust. My friend Dr. Heineken, thinking I should like to examine this worm, Colonel Gordon very politely sent it me in the wood. In one instance, just below where it was pursuing its circuitous course, there was a green healthy sprout; whilst all those above it were dead.

The following description will prove, that it forms a new genus of the second family of the third order of Cuvier's class, *annelides*, and its discovery is the more interesting, from the circumstance of the *lumbricus terrestris* having been hitherto the only known animal of the whole class that did not live in water. There being already a genus of insects named *xylophagus* by Fabricius, I would propose calling it *xyleborus*[g] *citri*.

Blood red; nerves radiating in fibres; body composed of thirteen rings or segments, united by flexible membranes; the segment nearest the mouth cartilaginous, the next four square, the rest round; jaws thick and forcible (protected by fleshy processes, one above, three below, and one on each side in the form of a fleshy spine), attached to a collar of six pieces, apparently for their support and movement; a small spine on each side of the upper part of each of the four first rings; without feet or moveable hairs; breathing by the pores of the skin; the intestine longer than the body, and forming a fold before it reaches the anus, as in the genus *thalassemo*; white; ½ an inch long, diameter of the first ring ⅛, the others decreasing gradually until the body terminates almost in a point. Vide fig. 35, *a* and *b*.

If Homer's beautiful description of the Phœacian Isle, where fruit succeeded fruit, and flower followed flower, in rich and endless variety, be applicable to any modern one, it is to Madeira.

[g] Ξυλησβορος qui lignum exedit aut vorat ut vermes.

I would beg the reader, as he shuts my book, to refer to those sixteen lines[h], for they convey a better idea of its blessings in this respect, than I have done in as many pages[i].

[h] Ὀδυσσ. η' 112—128.

[i] I have just learned, from the best Portuguese authority, that, by the census lately made, the inhabitants amount to 98,000 and a fraction; that of 1813, as I have already submitted, gave 90,916; so that the increase in ten years is fourteen per cent, or the same as that of Great Britain in the ten years between 1801 and 1811.

BOTANICAL APPENDIX.

LIST OF PLANTS FOUND IN MADEIRA.

INDIGENOUS.	SITUATION.	NATURALISED.	SITUATION.	CULTIVATED.	SITUATION.
Algæ.		*Algæ.*		*Algæ.*	
Ulva	Rocks of sea-shore, and corallines.	0		0	
Fucus					
Fungi.		*Fungi.*		*Fungi.*	
Agaricus aurantiacus .	Chestnut-trees of Jardin.	0		0	
——— campestris .	Mountains, 5300 ft.				
——— ———. .	Ditto, 3000 ft.				
Clavaria lauri . .	Laurels and chestnuts				
——— ——. . .	Mountains near Jardin				
Hypoxyla.		*Hypoxyla.*		*Hypoxyla.*	
0		0		0	
Lichenes.		*Lichenes.*		*Lichenes.*	
Lichen roccella . .	On & near sea-shore.	0		0	
——— ——— (Idiothalames)	Til-trees.				
——— ——— . .	General on rocks.				
——— ——— . .	Ditto.				
——— ——— . .	Ditto.				
Variolaria ? . . .	Ditto.				
Lecidea	Ditto.				
Usnea	Til, vaccinia, et ericæ				
Cladonia	Ruivo, and on rocks.				
Scyphophorus pyxidate .	On banks under vaccinia.				
Hepaticeæ.		*Hepaticeæ.*		*Hepaticeæ.*	
Marchantia stellata . .	Jardin.	0		0	
Hepatica ——— (Homallophyles) . .	Funch.				
Sedgwickia hemispherica .	Ditto.				
Jungermannia . . .	2000 feet.				

Musci.		*Musci.*		*Musci.*	
Hypnum intricatum 1	General to 5000 feet, also on til lichen.	0		0	
Lycopodiaceæ.		*Lycopodiaceæ.*		*Lycopodiaceæ.*	
Lycopodium . .	Lombo grande, 2900 feet.	0		0	
Filices.		*Filices.*		*Filices.*	
Acrostichum bipinnatus .	General.	C		0	
——— . . .	Ditto.				
Polypodium . . .	Ditto.				
——— aculeatum .	Torrents, &c.				
——— vulgare ? .	General.				
——— . . .	Ditto.				
Aspidium ramosum . .	Ditto.				
——— subquinquefidum	Ditto.				
——— viridulum . .	Torrents.				
Adiantum Africanum . .	General to 3000 feet.				
——— . . .	Ditto.				
Asplenium palmatum . .	Vicente to 3000 feet.				
——— an hirsutum ? .	General.				
Pteris aquilina . .	Ditto.				
Lomaria acuminata . .	Ditto.				
——— semicylindrica .	Ditto, by streams.				
Lindsæa . . .	Ditto.				
Davallia Canariensis .	Ditto, by streams.				
Woodwardia ? . . .	Foot of Ruivo.				
Rhizospermæ.		*Rhizospermæ.*		*Rhizospermæ.*	
0		0		0	
Cicadeæ.		*Cicadeæ.*		*Cicadeæ.*	
0		0		0	
Equisetaceæ.		*Equisetaceæ.*		*Equisetaceæ.*	
Equisetum arvense . .	Funch.	0		0	
Naïades.		*Naïades.*		*Naïades.*	
Lemna gibba . . .	Funch. to 2000 feet.	0		0	
Aroïdeæ.		*Aroïdeæ.*		*Aroïdeæ.*	
Arum proboscideum . .	Funch. to 2000 feet.	0		Calla Æthiopica . .	Funch. to 2600 feet.
——— ——— . .	Ditto, to 2600 feet.				

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Piperaceæ.		*Piperaceæ.*		*Piperaceæ.*	
0		0		0	
Typhæ.		*Typhæ.*		*Typhæ.*	
0		0		0	
Cyperoïdeæ.		*Cyperoïdeæ.*		*Cyperoïdeæ.*	
0		0		0	
Gramineæ.		*Gramineæ.*		*Gramineæ.*	
Oryzopsis asperifolia? .	Funch.	Saccharum officinale . .	Funchal, &c.	Oryza sativa . . .	Funchal.
Briza maxima . .	Ditto to 3000 feet.			Triticum hybernum? . .	Ditto, &c.
—— media . . .	Ditto, ditto.			Zea mays . . .	Ditto.
Alopecurus . . .	Ditto, ditto.			Bambusa arundinacea .	Ditto.
Paspalum . . .	Ditto, ditto.			Panicum polygamum .	Ditto.
Arundo sagittata . .	Ditto to 2000 feet.				
Phleum Gerardi . .	Funchal, &c.				
Agrostis pyramidata .	Ditto.				
——— . . .	Ditto.				
Poa aquatica . . .	Torrents.				
—— sicula . . .	Funch.				
——	Ditto.				
——	Mountains.				
Milium paradoxum . .	Funch.				
——— punctatum .	Ditto.				
Festuca arundinacea .	Western shores.				
Restiaceæ.		*Restiaceæ.*		*Restiaceæ.*	
0		0		0	
Palmæ.		*Palmæ.*		*Palmæ.*	
0		0		Phœnix dactylifera . .	Funch.
				Cocos nucifera . .	Ditto.
Asphodeleæ.		*Asphodeleæ.*		*Asphodeleæ.*	
0		0		0	
Smilaceæ.		*Smilaceæ.*		*Smilaceæ.*	
0		0		0	

Asparagineæ.		*Asparagineæ.*		*Asparagineæ.*	
Ruscus androgynus . .	Funch. to 5000 feet.	Dracæna draco (an indigena)	Funch. to 2000 feet.	Asparagus officinalis, (*Asphodeleæ, R. Brown.*)	Funch. to 2050 feet.
——— hypoglossum .	Ditto, ditto.				
Dioscoreæ.		*Dioscoreæ.*		*Dioscoreæ.*	
Dioscorea sativa (a naturalized ?) . . .	Heights behind Porto Menez.	0		Dioscorea alata . .	Funch.
Junceæ.		*Junceæ.*		*Junceæ.*	
Juncus glaucus. . .	3—5000 feet.	0		0	
Commelineæ.		*Commelineæ.*		*Commelineæ.*	
0		0		Tradescantia virginica .	Funchal, &c.
				——— discolor .	Ditto.
Alismaceæ.		*Alismaceæ.*		*Alismaceæ.*	
0		0		0	
Colchicaceæ.		*Colchicaceæ.*		*Colchicaceæ.*	
0		0		0	
Liliaceæ.		*Liliaceæ.*		*Liliaceæ.*	
Lilium Madeirense . .	Funch. to 2600 ft.	0		Pitcairnia latifolia . .	Funchal, &c.
Allium moly . . .	——— ditto.			Aloe vulgaris . . .	Ditto.
Ornithogalum arabicum .	——— ditto.			Hyacinthus . . .	Ditto.
				Phalangium . .	Ditto.
				Lilium candidum . .	Ditto and Jardin.
				——— bulbiferum . .	Ditto, Ditto.
				Polyanthes tuberosa .	Ditto, Ditto.
				Yucca gloriosa . .	Ditto.
				——— aloëfolia . .	Ditto.
Hemerocallideæ.		*Hemerocallideæ.*		*Hemerocallideæ.*	
0		0		0	
Narcisseæ.		*Narcisseæ.*		*Narcisseæ.*	
0		Agave tuberosa ? . . .	Funchal.	Narcissus poeticus . .	Funchal and Jardin.
				——— major . . .	Ditto, Ditto.
				——— bifrons . . .	Ditto, Ditto.
				Bromelia ananas, (*Bromeliæ, Juss.*) . .	Ditto.

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Amaryllideæ.		*Amaryllideæ.*		*Amaryllideæ.*	
0		0		0	
Hæmodoraceæ.		*Hæmodoraceæ.*		*Hæmodoraceæ.*	
0		0		0	
Irideæ.		*Irideæ.*		*Irideæ.*	
Gladiolus Byzantinus .	Funch.	0		Antholyza Æthiopica .	Funch., &c.
				Ixia monadelpha, &c. .	Ditto, ditto.
				Ferraria tigridea . .	Ditto, ditto.
				Pontederia, (*Pontederiæ Humb.*) . . .	Ditto, ditto.
Scitamineæ.		*Scitamineæ.*		*Scitamineæ.*	
0		0		0	
Musæ.		*Musæ.*		*Musæ.*	
0		Musa sapientum . .	Funchal, &c.	0	
Cannæ.		*Cannæ.*		*Cannæ.*	
0		Canna Indica . .	Funch. to 2600 feet.	Amomum Zingiber . .	Funch.
				Maranta Indica . .	Ditto.
				Curcuma longa . .	Ditto.
Orchideæ.		*Orchideæ.*		*Orchideæ.*	
0		0		0	
Pandaneæ.		*Pandaneæ.*		*Pandaneæ.*	
0		0		0	
Hydrocharideæ.		*Hydrocharideæ.*		*Hydrocharideæ.*	
0		0		Nymphæa alba . .	2000 feet.
				——— cœrulea . .	Ditto.
Aristolochiæ.		*Aristolochiæ.*		*Aristolochiæ.*	
0		0		Aristoloehia . . .	Funch.
Santalaceæ.		*Santalaceæ.*		*Santalaceæ.*	
0		0		0	

Elæagneæ.		*Elæagneæ.*		*Elæagneæ.*	
0		0		0	
Myrobolaneæ.		*Myrobolaneæ.*		*Myrobolaneæ.*	
0		0		0	
Thymeleæ.		*Thymeleæ.*		*Thymeleæ.*	
0		0		0	
Proteaceæ.		*Proteaceæ.*		*Proteaceæ.*	
0		0		0	
Myristiceæ.		*Myristiceæ.*		*Myristiceæ.*	
0		0		0	
Laurineæ.		*Laurineæ.*		*Laurineæ.*	
Laurus fœtens . .	Funch. & mountains.	0		Laurus nobilis . .	Funch.
——— indica . .	Ditto, ditto.				
——— cupularis . .	Ditto, ditto.				
——— parviflora . .	Mountains.				
——— membranacea ?	Ditto.				
——— umbellata ? . .	Ditto.				
Polygoneæ.		*Polygoneæ.*		*Polygoneæ.*	
Polygonium persicarium	Funch., &c.	0		0	
———	Ditto.				
Rumex acetosella . .	Ditto.				
Atripliceæ.		*Atripliceæ.*		*Atripliceæ.*	
Phytolacca decandra .	Funch. to 2000 feet.	0		Beta vulgaris . .	Funch. and Jardin.
Salsola verticillata . .	Sea-shore.			Spinacia oleracea . .	Ditto.
Beta	Funch. to 2600 feet.				
Amaranthi.		*Amaranthi.*		*Amaranthi.*	
0		0		Celosia cristata . .	Funch., &c.
				Gomphrena globosa .	Ditto, to 2000 feet.
Paronychiæ.		*Paronychiæ.*		*Paronychiæ.*	
0		0		0	
Plantagineæ.		*Plantagineæ.*		*Plantagineæ.*	
Plantago tomentosa .	Funch., &c.	0		0	
——— major . .	Ditto.				

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Nyctagineæ.		*Nyctagineæ.*		*Nyctagineæ.*	
0		0		Mirabilis longiflora . .	Funch., &c.
Plumbagineæ.		*Plumbagineæ.*		*Plumbagineæ.*	
0		0		0	
Lysimachiæ.		*Lysimachiæ.*		*Lysimachiæ.*	
Selago hirta ? . .	Funch., &c.	0		Primula elatior . .	Jardin.
Anagallis cœrulea . .	Ditto.				
Lentibulariæ.		*Lentibulariæ.*		*Lentibulariæ.*	
0		0		0	
Utriculineæ.		*Utriculineæ.*		*Utriculineæ.*	
0		0		0	
Pediculares.		*Pediculares.*		*Pediculares.*	
0		0		0	
Orobancheæ.		*Orobancheæ.*		*Orobancheæ.*	
0		0		0	
Acantheæ.		*Acantheæ.*		*Acantheæ.*	
0		0		Justicia adhatoda . .	Funch.
Jasmineæ.		*Jasmineæ.*		*Jasmineæ.*	
Jasminum odoratissimum	Funch.	0		Jasminum Arabicum. .	Funch.
——— Azoricum . .	Ditto.			——— grandiflorum .	Ditto.
Oleineæ.		*Oleineæ.*		*Oleineæ.*	
0		0		Olea fragrans . . .	Funch.
				—— Europæa . . .	Ditto.
Viticeæ.		*Viticeæ.*		*Viticeæ.*	
0		0		Duranta ellisia . .	Funch.
				Lantana salvifolia . .	Ditto, to 2000 feet.
Verbenaceæ.		*Verbenaceæ.*		*Verbenaceæ.*	
Verbena officinalis . .	Funch., to 3000 feet.	0		Verbena triphylla . .	Funch.

Labiatæ.	
Mentha citrata	General.
——— gratissima	Ditto.
——— calaminta	Ditto.
——— sativa	Ditto, to 4000 feet.
——— lavendulæfolia	Funch.
Prunella ovata	Ditto, to 1800 feet.
Satureia filiformis	Ditto, to 2000 feet.
Stachys tomentosis ?	Ditto, &c.
Salvia	Ditto.
Nepeta Japonica	Ditto, to 4000 feet.
——— ———	Ditto, ditto.
Lavandula pinnata	Ditto, to 2000 feet.
——— viridis	Ditto, ditto.
Melissa cordifolia	Ditto, to 3000 feet.
——— ———	Ditto, ditto.
Thymus angustifolia	1 — to 4000 feet.
Ballota nigra	Jardin.
Marrubium ?	Funch., &c.
Origanum marjoranum	General to 3000 ft.
Myoporineæ.	
0	
Scrophulariæ.	
Dodartia Indica	Rocks on west shore
Digitalis sceptrum	1000 to 5000 feet.
——— purpurea	Ditto, ditto
Solaneæ.	
Solanum chenopodioides	Funch., &c.
——— pseudo-capsicum	Ditto.
——— lycopersicum	Ditto.
——— pubescens	Torrents.
——— triquetrum	Funch., &c.
———	Ditto.
Capsicum baccatum	Ditto.
——— cerasiforme	Funch. to 2000 feet
Cestrum vespertinum	Ditto, &c.
Herschelia edulis	Ditto to 2000 feet.
Pedalineæ.	
0	

Labiatæ.	
Rosmarinus officinalis	1 to 3000 feet.
Myoporineæ.	
0	
Scrophulariæ.	
0	
Solaneæ.	
Pedalineæ.	
0	

Labiatæ.	
Lavandula spicata	Funch., &c.
Salvia officinalis	Ditto.
Myoportneæ.	
0	
Scrophulariæ.	
Antirrhinum majus	Funch., &c.
———	Ditto.
Maurandya semperflorens ?	Ditto.
Solaneæ.	
Solanum melongena	Funch.
——— tuberosum	Ditto.
——— guineense	Ditto.
Capsicum grossum	Ditto.
——— frutescens	Ditto.
——— annuum	Ditto.
Datura stramonium	Ditto.
——— metel	Ditto.
Pedalineæ.	
0	

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Borragineæ.		*Borragineæ.*		*Borragineæ.*	
Echium giganteum	rocks from 2 to 4000 ft.	0		Borago officinalis	Funch. to 2000 feet.
——— vulgare	Funch. to 3000 feet.			Heliotropium Indicum	Funch.
Convolvulaceæ.		*Convolvulaceæ.*		*Convolvulaceæ.*	
Convolvulus tricolor	Funch., &c.	Convolvulus batatas	Funch. to 3000 ft.	0	
Polemoniaceæ.		*Polemoniaceæ.*		*Polemoniacæ.*	
0		0		Cobæa scandens	Funch.
Bignoniæ.		*Bignoniæ.*		*Bignoniæ.*	
0		0		Bignonia pandoræ	Funch.
				——— radicans	Ditto.
Gentiancæ.		*Gentianæ.*		*Gentianæ.*	
0		0		0	
Apocyneæ.		*Apocyneæ.*		*Apocyneæ.*	
0		Vinca major	Jardin, &c.	Vinca rosea	Funch. &c.
		Plumeria incarnata	Funch.	Nerium oleander	Ditto, to 3000 feet.
				Stapelia maculosa	Funch.
				——— variegata	Ditto.
				——— verrucosa	Ditto.
Asclepiadeæ.		*Asclepiadeæ.*		*Asclepiadeæ.*	
0		Asclepias fruticosa	Funch. to 3000 feet.	Asclepias curassavica	Funch.
Sapoteæ.		*Sapoteæ.*		*Sapoteæ.*	
0		0		0	
Myrsineæ.		*Myrsineæ.*		*Myrsineæ.*	
0		0		0	
Ebenaceæ.		*Ebenaceæ.*		*Ebenaceæ.*	
0		0		0	
Guiacaneæ.		*Guiacaneæ.*		*Guiacaneæ.*	
0		0		0	

Rhododendra.		*Rhododendra.*		*Rhododendra.*	
0		0		0	
Ericæ.		*Ericæ.*		*Ericæ.*	
Erica arborea	4 to 600 feet.	Arbutus canariensis	Funch., &c.	Erica	Funch.
—— scoparia	Funch. to 5000 feet.			——	Ditto.
Vaccinium cappadocium	2000 to 5000 feet.				
Arbutus phillyræfolia	Mountains.				
Clethra arborea ?	4500 feet west.				
Epacrideæ.		*Epacrideæ.*		*Epacrideæ.*	
0		0		0	
Stylideæ.		*Stylideæ.*		*Stylideæ.*	
0		0		0	
Campanulaceæ.		*Campanulaceæ.*		*Campanulaceæ.*	
Lobelia stricta	Funch. to 3000 feet.	0		0	
Goodenoviæ.		*Goodenoviæ.*		*Goodenoviæ.*	
0		0		0	
				Semiflosculosæ.	
Semiflosculosæ.		*Semiflosculosæ.*		Lactuca romana	Funch., &c.
Sonchus pinnata	2 to 4000 feet.	0			
——— radicata	Funch. to 2000 feet.				
Hieracium fruticosum	Funch. ditto.				
Leontodon taraxacum	Torrents and Jardin.				
——— scorzonera	Ditto, ditto.				
Tragopogon villosum	3000 feet.				
Andryala cheiranthifolia	Rocks near sea shore.				
——— crithmifolia	Ditto, ditto.				
Crepis bursiflora	Funch.				
Flosculosæ.		*Flosculosæ.*		*Flosculosæ.*	
Gnaphalium tomentosum	Rocks on sea shore.	Carthamus tinctorea	Rocks on sea-shore.	Santolina chamæcyparissus.	Funch.
Athanasia pubescens	Funch.		Funch.	Cynara scolyma	Ditto.
Arnica montana	3500 feet.		3500 feet.		
Carduus carlinoïdes	Funch.		Funch.		
Arctium tomentosum	Ditto.		Ditto.		
Stæhelina arborescens	4000 feet.		4000 feet.		
Centaurea lippii	Funch.		Funch.		

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Radiatæ.		*Radiatæ.*		*Radiatæ.*	
Chrysanthemum uliginosum	Waterfall.	0		Chrysanthemum grandiflorum et varietates	Funch. to 2000 feet.
——— montanum	Funch. & mountains.			Tagetes erecta	Funch.
——— maximum	Ditto, ditto.			Aster erecta et varietatis	Ditto, &c.
Anthemis	Western shores.			Dahlia purpurea et varietates	Funch.
Bidens radiata	Funch. to 2000 feet.			Helianthus annuus	Ditto, to 2000 feet.
——— dichotoma?	Ditto, ditto.			——— multiflorus	Ditto, ditto.
Arctotis angustifolia	Mountains.				
Cotula pyretharia	Funch., &c.				
Helenium pubescens	Ditto, to 3000 feet.				
Calendula officinalis	Ditto, ditto.				
Buphthalmum spinosum	Funch., &c.				
Dipsaceæ.		*Dispaceæ.*		*Dipsaceæ.*	
0		0		Scabiosa atra-purpurea	Funch.
Valerianeæ.		*Valerianeæ.*		*Valerianeæ.*	
0		0		Valeriana rubra	Funch., &c.
Rubiaceæ.		*Rubiaceæ.*			
Asperula aparine	1000 to 3000 feet.	0			
Galium purpureum	2 to 3000 feet.			*Rubiaceæ.*	
Rubia tinctorum	Funch. to 3000 feet.			Coffea Arabica	Funch., &c.
Caprifolia.		*Caprifolia.*		*Caprifolia.*	
Hedera helix	Funch. to 3000 feet.	0		Viburnum tinus	Funch. to 2000 feet.
Lorantheæ.		*Lorantheæ.*		*Lorantheæ.*	
0		Lonicera periclymenum	1000 feet in ravines.	Bouvardia triphylla?	Funch.
Araliæ.		*Araliæ.*		*Araliæ.*	
0		0		0	
Umbelliferæ.		*Umbelliferæ.*		*Umbelliferæ.*	
Anethum segetum	Rocks near shore.	0		Daucus carota	Funch. &c.
Sium falcarium	Mountains.				
Apium graveolens	Funch., &c.				
Ferula glauca	Sea shore.				

Ranunculaceæ.		*Ranunculaceæ.*		*Ranunculaceæ.*	
0		Ranunculus graminius .	Funch., &c.	Clematis triternata . .	Funch. .
				Delphinium alatum . .	Ditto.
				——— consolida	Ditto.
Papaveraceæ.		*Papaveraceæ.*		*Papaveraceæ.*	
Fumaria parviflora . .	Funch. to 3000 feet.	Papaver rhœas . .	Funch., &c.	0	
——— lutea . . .	Ditto, ditto.				
Cruciferæ.		*Cruciferæ.*		*Cruciferæ.*	
Cheiranthus mutabilis .	Funch. &c.	Brassica napus . .	Funch. to 2000 feet.	Cochlearia armoracia .	Funch., &c.
Sisymbrium narsturtium .	General in streams.	——— creta . .	Ditto, ditto.	Cheiranthi varietatis .	Ditto.
Raphanus raphanistrum .	Ditto by streams.	Cheiranthus littoralis .	Funch.		
Isatis tinctorea . .	Funch., &c.	Raphanus sativus . .	Ditto, &c.		
—— hirsuta . . .	Ditto.				
Myagrum rapistrum . .	Rocks above Funchal.				
Capparideæ.		*Capparideæ.*		*Capparideæ.*	
Reseda luteola . . .	Sea shore west.	0		Reseda odorata . .	Funch., &c.
Droseræ.		*Droseræ.*		*Droseræ.*	
0		0		0	
Sapindi.		*Sapindi.*		*Sapindi.*	
0		0		0	
Acera.		*Acera.*		*Acera.*	
0		0		Acer pseudo platanus .	2 to 3000 feet.
Hippocrateæ.		*Hippocrateæ.*		*Hippocrateæ.*	
0		0		0	
Malpighiaceæ.		*Malpighiaceæ.*		*Malpighiaceæ.*	
0		0		0	
Hyperica.		*Hyperica.*		*Hyperica.*	
Hypericum androsæmum	2 to 3000 feet.	0		0	
——— elatum . .					
Guttiferæ.		*Guttiferæ.*		*Guttiferæ.*	
0		0		0	

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Aurantia.		*Aurantia.*		*Aurantia.*	
0		Citrus aurantium . .	Funch., &c.	0	
		—— medica . . .	Ditto.		
		Limonia pusilla . .	Ditto.		
Ternstromiæ.		*Ternstromiæ.*		*Ternstromiæ.*	
0		0		0	
Theaceæ.		*Theaceæ.*		*Theaceæ.*	
0		0		Thea viridis . . .	Funch.
				Camellia japonnica . .	Ditto to 2000 feet.
Meliaceæ.		*Meliaceæ.*		*Meliaceæ.*	
0		0		Melia azedarach . .	Funch. to 3000 feet.
Vites.		*Vites.*		*Vites.*	
0		Vitis vinifera et varietates	Funch. to 3000 feet.	Cissus quinquefolia . .	Funch.
Gerania.		*Gerania.*		*Gerania.*	
Erodium cicutarium . .	Funch. to 3000 feet.	Pelargonium et species et varietates . . .	Funch. to 3000 feet.	Impatiens balsamita . .	Funch., &c.
Geranium palmatum . .	Ditto, ditto.	Impatiens coccinea . .	Funch. &c.		
———— pusillum . .	Ditto, ditto.	Tropæolum majus . .	Ditto.		
Hermanniaceæ.		*Hermanniaceæ.*		*Hermanniaceæ.*	
Oxalis luteola . . .	3000 feet.	0		Oxalis	Funch.
Malvaceæ.		*Malvaceæ.*		*Malvaceæ.*	
Sida carpinifolia . .	Funch. to 1000 feet.	0		Hibiscus radiatus . .	Funch.
Malva mauritiana . .	Ditto, &c.			———— rosa sinensis .	Ditto.
Lavatera trilobata . .	Jardin.			———— hirtus . .	Ditto.
				———— sabdariffa . .	Ditto.
				Gossypium vitifolium .	Ditto.
				———— hirsutum .	Ditto.
Magnoliæ.		*Magnoliæ.*		*Magnoliæ.*	
0		0		Magnolia grandiflora .	Funch., &c.
				———— purpurea . .	Ditto.
				———— fuscata . .	Ditto.

Dillenaceæ.		*Dillenaceæ.*		*Dillenaceæ.*	
0		0		0	
Annonæ.		*Annonæ.*		*Annonæ.*	
0		0		Jambolifera—Rutaceæ (Juss.)	Funch.
				Annona squamosa . .	Ditto.
Menispermæ.		*Menispermæ.*		*Menispermæ.*	
0		0		0	
Berberides.		*Berbezides.*		*Berberides.*	
0		0		Berberis vulgaris . .	Funch. to 2000 feet.
Tiliaceæ.		*Tiliaceæ.*		*Tiliacea.*	
0		0		Laëtia completa . .	Funch.
Cisti.		*Cisti.*		*Cisti.*	
Viola odorata . .	General to 3000 feet and at 5000 feet.	0		0	
Cistus lævipes . .	Funch. &c.				
Rutaceæ.		*Rutaceæ.*		*Rutaceæ.*	
Melianthus major . .		Ruta graveolens . .	Funch. to 3000 feet.	Diosma linearis . .	Funch., &c.
Caryophylleæ.		*Caryophylleæ.*		*Caryophylleæ.*	
Cucubalus littoralis . .	Sea shore.	0		Linum usitatissimum . .	Funch., &c.
				Dianthus barbatus . .	Ditto.
				——— et species et varietata . . .	Ditto.
Semperviva.		*Sempervivæ.*		*Sempervivæ.*	
Sedum		0		Crassula	Funch.
Sempervivum glutinosum	Funch. and rocks of shore and ravines.				
——— tectorum					
Saxifrageæ.		*Saxifrageæ.*		*Saxifrageæ.*	
Saxifraga . . .	Rocks of ravines.	0		Hydrangia—et varietates .	Funch. to 2000 feet.
Cacti.		*Cacti.*		*Cacti.*	
Cactus opuntia . . .	Sea shores.	Cactus ficus indica . .	Sea shores.	Cactus triangularis . .	Funch.
				——— elatior . . .	Ditto.
				——— arborea . .	Ditto.

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Grossulariæ.		*Grossulariæ.*		*Grossulariæ.*	
0		0		Ribes uva crispa . .	2 to 3000 feet.
Portulaceæ.		*Portulaceæ.*		*Portulaceæ.*	
0		Tamarix gallica . .	Funch.	0	
Ficoïdeæ.		*Ficoïdeæ.*		*Ficoïdeæ.*	
Mesembryanthemum cristallinum . . .	Funch. to 2000 feet.	0		Mesembryanthemum reptans	Funch.
	Ditto, ditto.			——— stellatum	Ditto.
				——— striatum	Ditto.
				Tetragonia expansa . .	Ditto.
Onagræ.		*Onagræ.*		*Onagræ.*	
0		Fuchsia coccinea . .	Funch. to 3000 feet.	Œnothera pumila . .	Funch. to 2000 feet.
Loaseæ.		*Loaseæ.*		*Loaseæ.*	
0		0		0	
Myrti.		*Myrti.*		*Myrti.*	
Myrtus communis . .	Funch. to 2600 feet.	Myrtus mucronata . .	Funch. to 2000 feet.	Eugenia malaccensis .	Funch.
		——— procera . .	Ditto, ditto.	———	Ditto.
				Psydium pyriferum . .	Ditto.
				Myrtus pimenta . .	Ditto.
				Punica granatum . .	Ditto.
				——— nanum . . .	Ditto.
				Melaleuca squarrosa . .	Ditto.
				Metrosideros . . .	Ditto, &c.
Melastomæ.		*Melastomæ.*		*Melastomæ.*	
0		0		0	
Salicariæ.		*Salicariæ.*		*Salicariæ.*	
0		0		0	
Rosaceæ.		*Rosaceæ.*		*Rosaceæ.*	
Agrimonia parviflora .	Funch. to 3000 feet.	Rosa semperflorens . .	Funch. to 3000 feet.	Calycanthus floridus . .	Funch., &c.
Fragaria alpina . .	Ditto, ditto.	——— benghalensis . .	Ditto, ditto.	Mali varietates	Funch. to 3000 feet
Rubus fruticosus . .	General to 3000 ft.			Fragariæ . . .	Ditto, ditto.

Rosaceæ—continued.				*Rosaceæ*—continued.	
Potentilla fragaroïdes	1 to 3000 feet.			Pyri varietates	Funch. to 3000 feet.
Verbascum pulverulentum	1 to 4000 feet.			Mespilus germanica	Ditto, ditto.
Rosa	1 to 3000 feet.			Rosa flore pleno	Ditto, ditto.
				—— bracteata	Ditto, ditto.
				—— rubicans	Ditto, ditto.
				—— præcox	Ditto, ditto.
				—— damascena	Ditto, ditto.
				——	Funch.
				—— multiflora	Ditto.
				Rubus idæus	Ditto to 2000 feet.
				Prunus domesticus et varietates	Ditto to 3000 feet.
				Amygdalus et varietates	Funch., &c.
Leguminosæ.		*Leguminosæ.*		*Leguminosæ.*	
Ulex Europæus	2000 to 3000 feet.	Mimosa cornigera	Funch.	Lupinus perennis	Funch. to 3000 feet.
Genista spartium	Funch. to 3700 feet.	Trifolium pratense	Funch. and Jardin.	Crotalaria	Ditto.
Astragalus montanus	Funch., &c.			Acacia	Ditto, to 3000 feet.
Hedysarum nitidum	Jardin.			Inga	Ditto.
Lotus glaucus	Funch.			Mimosa pudica	Ditto.
——	3000 feet.			——— sensitiva	Ditto.
Cassia acuminata	Funch., &c.			——— decorans	Ditto.
Lathyrus	Ditto, to 2000 feet.			Tamarindus Indica	Ditto.
Orobus	Ditto, ditto.			Cercis siliquastrum	Ditto.
				Arachis hypogea	Ditto.
				Dolichos albus	Ditto, to 3000 feet.
				——— hydnosus	Ditto.
				———	Ditto.
				Phaseolus vulgaris	Ditto, to 3000 feet.
				Parkinsonia aculeata	Ditto.
				Erythrinum corallodendrum	Ditto.
				———	Ditto.
				Coronilla glauca	Ditto.
				Moringa zeylanica	Ditto.
				Lotus Jacobæus	Ditto.
				Colutea arborescens	Ditto.
Terebinthaceæ.		*Terebinthaceæ.*		*Terebinthaceæ.*	
0		Juglans regia	Funch. to 3000 feet.	Mangifera Indica	Funch.
Rhamnoïdeæ.		*Rhamnoïdeæ.*		*Rhamnoïdeæ.*	
Ilex Madeirensis	Mountains of interior.	0		Celastrus	Funch.
—— perado?	Ditto, ditto.				

INDIGENOUS.	SITUATION.	NATURALIZED.	SITUATION.	CULTIVATED.	SITUATION.
Euphorbiacæ.		*Euporbiaceæ.*		*Euphorbiaceæ.*	
Euphorbia ocymoïdea .	Funch., &c.	Buxus suffruticosa . .	Funch. to 2600 feet.	Jatropha manihot . .	Funch.
——— . . .	Sea-shore, west.	—— sempervirens . .	Ditto, ditto.	——— curcas . .	Ditto.
Buxus	Mountains.			Ricinus communis . .	Ditto, &c.
Mercurialis annua . .	Funch., &c.				
Cucurbitaceæ.		*Cucurbitaceæ.*		*Cucurbitaceæ.*	
0		Cucurbita latior . .	Funch. to 3000 ft.	Sicyos parviflora . .	Funch.
		——— melopepo .	Ditto.	Cucumis prophetarum .	Funch., &c.
				——— .	Ditto, ditto.
				Carica papaya . .	Ditto.
Napoleoneæ.		*Napoleoneæ.*		*Napoleoneæ.*	
0		0		0	
Passifloræ.		*Passifloræ.*		*Passifloræ.*	
0		0		Passifloræ et species et varietates . . .	Funch., &c.
Urticæ.		*Urticæ.*		*Urticæ.*	
0		Ficus carica . . .	Funch., &c.	Morus	Funch., &c.
				Artocarpus incisa . .	Ditto.
Amentaceæ.		*Amentaceæ.*		*Amentaceæ.*	
Myrica	Mountains.	Populus fastigiata . .	3000 feet.	Salix babylonica . .	Funch.
Salix rubra . . .	2 to 3000 feet.	Fagus castanea . .	Funch. to 3000 feet.	Populus alba . .	Jardin.
				Quercus suber . .	Funch.
				——— . .	Ditto, &c.
				Platanus Orientalis .	Ditto.
Coniferæ.		*Coniferæ.*		*Coniferæ.*	
Taxus baccata . .	Coural & mountains.	0		Cupressus sempervirens .	Funch.
—— Canadensis . .	Funch. to 2000 feet.			——— thyoïdes . .	Ditto.
Juniperus drupacea .	Mountains.			——— horizontalis .	Ditto.
Cupressus Madeirensis .	Ditto.			Pinus sylvestris . .	1 to 3000 feet.
				—— larix . . .	Mountains.
				Larix cedrus . . .	Ditto.
Incertæ sedis.		*Incertæ sedis.*		*Incertæ sedis.*	
Goodallia . . .		0		Condalia . . .	Funch.
——— . . .	Sea-shore.			Begonia evansiana . .	Ditto.
——— . . .	Ditto.			——— obliqua . .	Ditto.

The Begonia has been considered by M. de Jussieu, since he published his Genera Plantarum, as the type of a new family, but I do not exactly know its place amongst the natural orders.

LIST OF INSECTS FOUND IN MADEIRA.

1. Theridium—*Walckenær*. Sp. unknown. Vide fig. 24.
2. Thomisus—a species analagous to the Aranea Venatoria of *Linnæus*, to the T. Canceridus of *Walckenær*, and the T. Leucosia of *Fabricius*. It also bears much affinity to a species of Selenops from Senegal.
3. Thomisus? vid. fig. 23.
4. A species of Polydesmus, very near to the Julus Complanatus of *Fabricius*.
5. Ricinus—vid. fig. 22, *a* and *b*.
6. Locusta—a species apparently near to the Locusta falx of *Fabricius*, also from Madeira.
7. Locusta albifrons, vid. fig. 21, *a* and *b*.
8. A species of Acheta, very near to the Morio of *Fabricius*.
9. Acheta—apparently the A. domestica. *Fab.*
10. Gryllus—Lin. Acrydium. *Geoffroi*.
11. Æshna—approaching to the Æshna grandis, *Fab.*, and greatly resembling the species figured by *Rœsel, tom. 2. insect. aquat. tab. 2, fig. 1.*
12. Apis mellifica. *Lin.*

NARRATIVE.

NARRATIVE.

CHAPTER I.

Arrival of the Governor at Funchal.—The Proceedings of the New Powers.—Departure from Madeira.—Teneriffe.—Arrival at Bona Vista.—Senhor Martins' House.—Governor and Family.—Society.—Manners.—Prisoners from St. Jago.—Going to Mass.—Arrival of Despatches from Lisbon.—St. Antonio.—Departure for the River Gambia.—Character of the Owner of the Schooner.—St. Jago.—Arrival at Bathurst.—Mr. Bowdich's Illness and Death.

I FEEL so great a repugnance to appear before the public, and so great a distaste to those subjects in which I have lost my guide and instructor, that the present narrative will labour under many disadvantages, besides those which may arise from incapability. It is but justice, however, to those who felt interested for Mr. Bowdich in his public character, without any dearer tie of friendship, and to those who make the cause of science their own, to relate the circumstances of his last voyage, with their fatal result.

I particularly lament, that, contrary to his usual custom, his notes were very few, and those so obscurely written, that even I,

who am so accustomed to decipher his memoranda, can derive but little assistance from them: therefore, that I may not injure a reputation which stood so fair with the learned and the good, I must request my readers to consider me as responsible for every error.

We did not quit Madeira, till we had witnessed the deposition of the Constitutional Governor, and the arrival of the Marquis de Portogallo in his place*. Notwithstanding many important affairs of my own to attend to, and the few charms that politics possess for a female, I could not but be struck, when in Lisbon, with the unfitness of the people to receive the blessing for which they had contended. The reception given to the new Governor was a second proof, that these poor people were then unable to appreciate the liberty which secured them to their families, and gave them a right to think and act for themselves. The peasantry of Madeira, always influenced by their priests, had been taught by them to consider the constitution as an offence against the Divine will, and therefore gladly returned to bondage and the Inquisition. Reports (originating in a barber, I believe) had been transmitted to Lisbon, that the city of Funchal was in open rebellion against the new order of things, and about to declare itself, either for the Emperor of the Brazils, or totally independent; accordingly, troops and artillery were sent to quell the supposed warfare, and unlimited commissions, and a gallows, given to three judges, to condemn and punish as they pleased. However, to the great astonishment of the royal party, all Madeira hailed the new arrivals with demonstrations of pleasure. The lower classes were riotous only in rejoicing; the ecclesiastics

* As this narrative was written during my last voyage from Africa, I could not be aware of the several changes that have taken place in the Portuguese Government, since the period of our departure from Madeira, but I do not erase these observations, as they characterize the revolution of 1823.

triumphed in the change, and malignantly sneered at all those who would before have restrained their rapacious power; the higher classes waited on the Governor with respectful obedience, and those who lamented the loss of their constitution, mingled with the rest, and after making their bow, quietly retired to their homes, wisely considering, that the few could not withstand the many, and it was useless to excite a hopeless struggle.

The despotic feelings of the new government were quickly manifested. The suspected were seized, and dragged to wretched prisons. The editor of the *Patriota Funchalense*, a man of amiable feeling and deportment; and the most celebrated lawyer of the place, although a priest, were among the first victims, and were in suspense concerning their fate when we quitted the island, the health of both, impaired from confinement and the unwholesome dungeons into which they had been plunged[b]. Depositions were taken, without searching into the characters of the witnesses; false oaths seemed trifles, when old women or young boys had any spite to gratify; the accused were not confronted with their accusers; a few notes of the constitutional hymn, falling from the lips of some thoughtless bullock-driver, were punished with imprisonment; some did not await their sentence, but poisoned themselves in despair; and no man dared to look his neighbour in the face, fearing his eyes might betray sentiments which his tongue dared not utter. The mildness, moderation, and gentlemanly feeling of the Governor, lessened the horrors of persecution, and no capital punishment took place while we remained; but (what was thought to be equally shocking) an *auto da fé* was made in the market-place, of the acts of the

[b] The editor of the *Patriota Funchalense* has since been banished to Terceira, but the poor lawyer would have had much more to encounter in his exile to Angola, had he not, by dint of great activity, hardihood, and talent, succeeded in getting his sentence repealed.

camera, and of all books and writings connected with the constitution.

We left the luxuries of a noble mansion and its adequate establishment, without other regret, than that of separating from its friendly owner; and full of animated hopes for the future, embarked on board an American brig, bound for the Cape de Verde Islands. We had lost all prospect of a vessel, that would convey us direct to Sierra Leone, and, hoping to profit by the delay, Mr. Bowdich determined to go to Bona Vista, and thence to Fogo, and the other islands, taking the chance of conveyance to Sierra Leone, by way of the Gambia. We weighed anchor at three in the afternoon of the 26th of October, 1823, but remained in sight of Madeira for forty-eight hours; and I cannot imagine any situation more tantalizing, than that of being on board a miserable, dirty vessel, tossing about with a foul wind, and a heavy swell, tormented with the worst sickness in the world, and still in sight of a beautiful shore, with all the comforts which wealth and friendship could supply, crowding upon the memory. I hid myself in my birth, and would not look out of it again, till well assured we had lost all view of Madeira; the recollection of its beauties, and all that had passed in it, would have rendered me unfit to encounter my new trials, and while surrounded by my husband and children, I should justly have felt ashamed of encouraging a single discontented feeling.

The master of our vessel was then making his first voyage as Captain, and dearly did we rue his inexperience. He possessed little or no authority over his crew, consisting of two mates, and five men, the former of whom plundered our provisions at pleasure; and, as he was extremely parsimonious, he not only shared in the spoil, but collected the remnants of our meals (thereby depriving his half-fed men) for his own table. Our good friend had amply supplied us with delicious wine, and Mr. Bow-

dich had agreed with me, that the malmsey at least would be wasted, if broached at sea: reserving it, therefore, for better times, we left the cask untouched; but, tired with the disagreeables attending the voyage, our resolution gave way, and we had recourse to our treasure. To our great dismay, however, not a single drop of malmsey, or any other sort, was left us. This disappointment entailed upon us suspicion in its fullest extent, and we feared for every part of our property which might be deemed valuable to another. My imagination carried me to a considerable length, to the no small entertainment of Mr. Bowdich and myself also, after I recovered from my fright. On a former occasion, I had been five days in the same ship with a murderer, who was going home to take his trial, and his appearance, added to his own description of his barbarity, so strongly excited my terror, that although it was a near approach to suffocation, from the warmth of the climate, I could only rest while my child was shut up with me in our little state room. By a remarkable coincidence, the first mate of the American, with red hair, and redder eyes, resembled this criminal, (whose features I had never forgotten) and Mr. Bowdich having taxed him very warmly with the theft of our wine, and he becoming very sulky, I could not divest myself of the idea that he would be revenged. After I had passed two sleepless nights in secretly watching him, on the third, he approached Mr. Bowdich's birth, with great caution and hesitation, his hand resting upon a large knife he always wore in his bosom; I started from my mattress, and he retreated. I then waked Mr. Bowdich, and, fearful of being understood by others, related my fears to him in Italian; he ridiculed me of course, but at my earnest entreaty, promised to be upon his guard, and agreed to feign sleep, should the man re-enter the cabin, which he did in about an hour. Carefully looking around him, he went first to the birth where my maid and child were sleeping, and

afterwards passed to mine, where he found every thing apparently quiet. He then drew out his knife, and crossed over to Mr. Bowditch; my agony was excessive, but he only proceeded to a locker close by, took out a piece of cold pork, cut off a large slice, and bore it triumphantly away. I greatly hoped that this proceeding had passed unnoticed by Mr. Bowditch, and I should certainly have kept my own secret; but a peal of laughter soon convinced me I had not escaped, and had for life exposed myself to his ridicule. I was so ashamed, that I should not now have related the circumstance, but for the hope it might serve as a useful lesson to those of my own sex, who, like me, may indulge in groundless apprehensions.

After having been tossed about by contrary winds for ten days, the Captain evidently ignorant of his longitude, and uncertain of his latitude, yet so perfectly at his ease as to sleep half the day, and to grumble at being awoke in the night when squally, we heard the cry of land; and though the Peak of Teneriffe is not more than three days' sail from Madeira, we scarcely regretted our snail-like progress, when we went upon deck, and enjoyed a superb view of this stupendous mountain. We passed within four miles of the back of the island, and as the weather was quite clear, its snowy summit and smallest peaks were visible. We fancied we could trace the routes of the illustrious travellers who had visited it, and this incident served to heighten Mr. Bowditch's impatience to explore Fogo.

On the sixteenth day we came in sight of the island of Sal, looking like a coffin of sand, and passing it, reached Bona Vista, a name which must have been given in derision, for no land was ever so unpleasing to the sight; being a mere sand bank, with two peaks of bare basalt toward the middle, and not a trace of vegetation or humanity. The collection of hovels, called the town, is so completely hid in the bay, that being all strangers, and

the harts defective, we passed it twice, without even guessing at its situation. This obliged us to spend another night on board, with our provisions exhausted: we cheered ourselves, however, by the comforts we expected to share on the morrow.

The object of Mr. Bowdich's visit to Bona Vista, was to secure the good offices of Senhor Manoel Martins, not only to forward his scientific researches, but to assist him in proceeding to the river Gambia. This person, from the number of his slaves, his possessions in the different islands, and his extensive commerce, has acquired an influence and power, which render the Governor's authority nominal. He had been sent as deputy for the Cape de Verde Islands, to the Cortes, and upon the return of absolute monarchy in Lisbon, as he was too powerful to affront, his services were courted, to preserve tranquillity in these settlements. Circumstances, of a commercial and friendly nature, had given the house of Keir in Madeira so strong a claim upon him, that we delivered our letter of recommendation to the Harbour Master to forward, in the fullest confidence that we should be in possession of manifold comforts in a few hours: mid-day however arrived, and no news from the shore; and in the afternoon, completely worn out with expectation and hunger, Mr. Bowdich took the first boat he could get, and proceeded to Senhor Manoel's house. At seven in the evening, having given up all thoughts of landing till the next day, I made a sailor's mess of a remnant of chocolate found in a basket, and some of the Captain's biscuit and sandy sugar, for which I insisted on paying; and although eaten out of the saucepan, it was delicious to hungry mouths. At nine o'clock Mr. Bowdich returned to the vessel, with a basket of fresh biscuit, butter, wine, and oranges, generously supplied us by an Englishwoman, who had been shipwrecked, and was with her husband, waiting for an opportunity of returning to England. I was then informed, that the Governor and his whole suite were staying at

Senhor Manoel's, (having come to Bona Vista on the pretence of health) which rendered it impossible for that gentleman to accommodate us in his own house; and as there was scarcely another in the place, he requested us to go to a room in the custom-house, till an unfinished dwelling should be ready to receive us. He apologized for having suffered us to remain so long on board the ship, but stated, that he had been a few miles into the country with the Governor, and our letter did not reach him till his return; he promised every thing that Mr. Bowdich desired, not only to forward his schemes for visiting all the islands, by having vessels ready at any moment, but even offered to send us to the Gambia in one of his own schooners.

Exhilarated by these fair prospects, we left the American with no small thankfulness, and although prepared by Mr. Bowdich to see a house in the style of those inhabited by the Cape Coast Mulattoes, my expectations were far exceeded. I was presented to the Governor, and Senhor Manoel's eldest, unmarried daughter, an interesting girl of eighteen, and as soon as possible, we adjourned to the custom-house. The crowd of blacks thrusting themselves into our room, and the noise around, convinced us we were again in Africa, and on getting a bowl of milk for our children, and forcibly ridding ourselves of our numerous visitors, we felt indescribable satisfaction at being so far on our way to the desired land. At three we were summoned to dinner, and on this subject do I indeed regret, that I am not possessed of the animated powers of description which peculiarly characterized Mr. Bowdich's pen, that playful satire, which, repressed as it was by his benevolent heart, would occasionally burst from its control, only to be recalled by some winning action, which sealed the pardon before the offence could be recorded on the memory.

Our entrance was rudely obstructed by a formidable sentinel, with a ragged jacket, and a rusty cutlass, and without either shoes

or stockings. We then passed through a range of kitchens and hovels, inhabited by slaves; and the steams from the former, conveyed so strong a sensation of dirt, that it required a tolerable appetite to encounter the food which awaited us. Our progress was impeded by throngs of black, mulatto, and Portuguese children, of all sizes. We ascended a flight of dirty stairs, and on entering the room, were presented to the Governor's family. His wife, who is at the same time his niece, is fair, and possesses more charms of face than figure, for, added to the usual diminutive size of her countrywomen, she had so completely adapted her style of dress to the climate, that she needed a few elastic bandages, to put all in order again. Her sisters were both interesting, and all three evidently superior to the rest, whom, in deference to my sex, I cannot be uncharitable enough to describe, save one, who was remarkable for being at that time a bride. It is a cunning trick of young men, cadets for instance, to marry some old despairing relation of Senhor Manoel's, that they may claim a seat at his table, a room in his house, and save themselves the expense of living. The present instance proved how unnecessary were personal charms, manners, accomplishments, or fortune; for the bride, who had been a widow, was on the wrong side of forty, her countenance presenting a fine contrast of red pimples on a yellow ground, and her large limbs, and sullen looks, seemed to promise, that, when the first transports (which to my astonishment were not reserved for *tête à têtes*) were passed, she would become the preceptress of her husband, a boy of eighteen, and not spoil him for want of manual discipline; such chastisements being by no means rare on either side, in the annals of Portuguese conjugal happiness. This pair sat close together, almost on the same chair, ate off the same plate, and drank out of the same glass, the lady acting as a jackal, in clawing every thing she could catch for her lord.

When all were assembled, including visitors, strangers, relations,

and dependants, we generally formed a party of twenty. Piles of meat, stewed in grease, and oozing out their own under a burning sun, which seemed to varnish the eaters as well as eatables; large tureens of stagnant soup, pyramids of *bouilli*, *hors d'œuvres* of garlick, dressed in different fashions, were presented to us, escorted by myriads of black flies, that disputed every morsel; servants were obliged to stand behind us, and continually wave large cloths to keep them away; if this exercise ceased for a minute, the table would be almost black with these disgusting insects. The freedom of helping, the calling of different people for salt, bread, *&c.* made it so like a diligence dinner at a *bad* French inn, that could I have altered personal appearance a little, I should have fancied myself making the grand tour. Before the dessert arrived, the younger children, one of whom was only two years old, made their way from the kitchens below, where they had acquired all the dirt that would stick to their skins and clothes, and either bestriding the backs of young slaves, or crawling along the sanded floor, came in, bawling for wine and fruit. One of them, laying his greasy paws upon my silk gown, set his dirty foot on my knee, and in an instant mounted on to his father's chair, where he was caressed for the feat, and crammed till he was almost unable to return to the lower regions.

The breakfasts were as abundant as the dinners, and I was informed, that a supper was partaken of nightly, that did not yield in grossness to the other repasts; and thus did these people, males and females, with the thermometer ranging between 80° and 90°, daily devour this enormous quantity of animal food, with smaller meals intervening. I must not omit, however, to assure future travellers, that Bona Vista affords excellent fresh butter, milk, and eggs, things so grateful after a voyage; or to praise the unbounded hospitality of Senhor Manoel Martins. I have no doubt he would readily have extended his kindness to us for months, and he was

almost angry because we declined all meals except breakfast and dinner. He keeps a second table, at which his wife, who is an amiable, well-behaved woman, presides over her younger children, the clerks, &c.; and it is calculated, that two hundred mouths are daily supplied in this establishment.

Among the dependants of the household is a music-master, expressly imported from Lisbon to teach the children; but as neither masters nor misses have musical talents or inclination, he fills up his abundant leisure by keeping a little school, exercising his profession only in the evening, when he thumps out a sonata on the piano, amid a clamour of tongues which renders it impossible to do more than guess at the sounds he produces. This double function of his was no small inconvenience to Mr. Bowdich and myself, for his school-room, which was at the same time his bed-room, was only divided from our custom-house quarters by a demi-partition, to the top of which the scholars climbed, (their master assisting them by holding their legs) to peep over at the strangers, or through which they bored holes to shoot small seeds at us. On our complaining of this annoyance, he assumed a huge straw hat, and a tremendous broad sword, and paced up and down the room, to the amusement, not terror of his scholars, who enjoyed the joke too much to run away. This alone would have been a droll incident, but, after three days, the nuisance was augmented by the accession of a serjeant and some recruits, who, being followed by their male and female playmates, rendered our lodging so insupportable, that we could not remain in it. I have no doubt, that Senhor Martins thought us very affected, and consequently procrastinated our removal to the new house; but at last, when I took refuge with the English lady above mentioned, who kindly allowed me and my children to sleep on the floor of her room, he gave us leave to take up our abode with the carpenters, in the unfinished dwelling. Luckily, the wet plaster did us no

injury, and we were enjoying a little quiet, when a vessel arrived with prisoners from St. Jago, who had mutinied for want of pay, having been ten months without receiving a farthing, and being nearly reduced, with the rest of the Portuguese force at that place, to starvation. This was the real motive for the Governor's flight to Bona Vista, for he deemed his life in danger while at St. Jago, and so distant was the hope of relief from the mother country, and his last speculation in orchil having failed, he thought it wise to shelter himself under the protection of Senhor Martins.

After some months the insurrection was quelled, and the ring-leaders seized, who were the prisoners in question. They were put in irons immediately on arrival, stripped of all clothing, except a linen shirt and trowsers, and crowded with their wives and children into a low room, under those we occupied. Our comfort at home was destroyed by their conversation, intermingled with cries and complaints, and our compassion strongly excited whenever we went out, by their sickly and dejected appearance, as they hovered round the grating to breathe the fresh air[c]. This event was too important not to cause some commotion in the island; the guards (consisting of sentinels with no other covering than an old drab coat with a red collar, and the remnant of a cap, bearing a halberd staff on the right shoulder) were doubled[d], and the cracked

[c] The greater number of them were afterwards banished. We had at one time a chance of sailing with them, and I entertained great apprehension of their seizing the vessel, a circumstance which had taken place on a previous occasion; the convicts afterwards proceeding to Brazil.

[d] The valour of these military heroes is such, that, during the absence of Senhor Martins at the Cortez, an English man-of-war anchored outside the bay, undiscovered by those on shore, and sent an officer and boats crew in to ask for a little water. The appearance of the English uniform so appalled the residents of Bona Vista, that, the sentinels having given the alarm, soldiers, captain, whites, blacks, and mulattoes, all fled to the interior of the island, and left the town to the mercy of the supposed invaders; Senhora Martins only packing up as many of her valuables as were portable at the moment.

bell was sounded every half hour, accompanied by discordant cries of "all's well." The annoyance of these nightly sounds would alone have tempted me to let all the prisoners loose, could I have done so with impunity.

We found the Governor very gentlemanly, and speaking French fluently. What his influence might be at St. Jago I know not, but it did not even extend so far as to enable him to procure us a bird at Bona Vista. He kept up some sort of form however, by having an Orderly, who walked backwards and forwards through a room where he could be seen, or came to announce the alarming approach of a ship's boat, or the anxious one of a fruit boat from St. Jago, with despatches and oranges. We also saw a few insignia of grandeur in perspective, such as a scarlet cloth, bordered with black velvet, and thrown over a deal table. The secretary too was always at hand about dinner or breakfast time, with his manuscript in his hand, for the Governor's perusal, which he presented with the same air as a school-boy presents a Christmas carol, written under the inspection of his writing-master.

While the idea of ridicule is attached to every Portuguese colony, from its poverty, and affectation of state, under a total want of means to support even respectability, and peculiar contempt has been felt for that of the Cape de Verd Islands, from the description given of it by Captain Tuckey, I must beg leave to rescue the present Governor from the charges too justly laid upon his predecessor, Don Antonio. Mr. Bowdich, myself, and children, experienced every attention from him which he had the power of bestowing, and, had he possessed the means, I believe he would cheerfully have furthered Mr. Bowdich's views. But, totally dependant on Senhor Manoel, away from his own residence, without money, alarmed at the rebellion of his troops, and uncertain of the effect it might have upon the powerful of his own country, his Excellency must have been in a very unenviable state

of mind, till the day before our departure, when a vessel arrived with despatches from Lisbon. His conversation was good, his manners polite, and he pressed the few delicacies he had to offer for our acceptance, with a friendliness, which augured well of his disposition. The higher classes of most countries combine dignity with affability, and I never saw it more happily blended than in the females of the family; it completely reconciled me to the strange appearance of coarse, coloured, cotton gowns, washed out silk handkerchiefs, and a few nameless barbarisms, not yet banished by Portuguese good breeding.

Our second residence gave us a view of the Sunday cavalcade going to mass. It was preceded by a parade, summoned by a cracked drum; and such a mixture of tall and short, fat and lean, could not be exceeded by any caricaturist in the world. Not one of the soldiers but wanted shoes, or some part of his uniform; and their dismissal reminded me very forcibly of Bombastes Furioso taking leave of his men, the soldiers in question being quite as incapable of "making a row!" The black priest proceeded a few minutes before the rest, to assume his robes, and a servant in a mock livery headed the procession, carrying the Governor's daughter (a pretty clever child, five years old) in his arms. Papa and mamma went next, the former in a full suit of black, knee buckles, cocked hat, *&c.*; his lady in black silk and velvet, which was carefully laid aside immediately on her return, when she put on a white robe for dinner, which was changed for a coarse cotton stripe by tea time. The rest of the party walked indiscriminately, and feathers, and flowers, and dyes of every hue, were mingled with aid-de-camps, cadets, strangers, mulattoes, slaves, and ragged black children; the whole population running to the spot, to enjoy this display of grandeur.

A higher spectacle awaited us on the arrival of the vessel from Lisbon, which decided the Governor's fate, and as it just entered

the bay, as we entered the dinner-room, Mr. Bowdich and I sat in a quiet corner, and witnessed the whole effect. The excessive agitation of the Governor was evinced by his rubbing his forehead, pacing up and down the room in the most hurried manner, every five minutes looking through the telescope; and was finely contrasted with the coolness and security of our powerful host. A boat was sent with the cadets, secretary, and orderly, to receive the officers and the news, and soon a general rush to the door announced its return. Mutual embraces and exclamations were succeeded by the production of two crimson silk bags. The Governor instantly retired with his, and Senhor Manoel was quietly examining his own, and giving out the private letters before he thought of those which concerned himself, when his Excellency rushed back, hugged him round the neck, and congratulated him on the receipt of a fresh order of knighthood, the badge of which was accordingly tied on with a smart blue ribbon, by the Governor himself, and, a few minutes after, was subjected to the inspection of my young, greasy friend, above-mentioned, whose father, it seemed, thought it more fit to please his child than himself; and the next morning wisely resumed his coloured cotton jacket, observing, that if his sovereign had rewarded his services with a hundred pounds, he would have kept on a cloth coat for a few days. The bearer of the despatches, who was the Governor's aid-de-camp, was very pleasing both in manner and person, and as he brought approbation with him, was welcomed with an ardour which was very entertaining to English *sang froid*. The party was soon increased by the addition of all the Portuguese of the place, to receive intelligence; most of them had letters, the interesting parts of which they read aloud, even when they concerned none but themselves; exclamations of surprise and joy were mingled with the inquiries of those who received no news; the

Governor's brother-in-law snatched his sister's letters from her hand, and refusing to give them up, most provokingly read parts of sentences, which only served to heighten her curiosity and anger. I almost envied the general feeling, and so many happy faces would have been a gratifying sight, but for the interruption to the universal harmony, by the ex-governor of Bissao, who had been removed from his command by the Constitutional Government, for having too *openly* dealt in slaves, but who had expected his re-instatement. He would neither go away, nor sit down to table, and at last became quite clamorous: Senhor Martins, without regarding him, ate his dinner with his ustal coolness, and the Governor vainly read, and shewed him the passages in the despatch expressing *universal* satisfaction, but he raved on, till the Governor's lady condescended to soothe him into tranquillity. A marriage was to succeed this good news; and which I confess I should have liked to have witnessed, as I understood the ceremonies in our host's family to be very original.

I have been tempted to make this digression, by the general ignorance that prevails respecting the Cape de Verd Islands, and to prevent future travellers from being deceived, as we were, by the accounts given of the splendour of Senhor Manoel's establishment; accounts which are very generally received and propagated, people being too apt to blend magnificence with power, and, certainly, his influence at these settlements is complete. But it is time to return to ourselves.

Mr. Bowdich having claimed Senhor Manoel's first promise of forwarding his views of discovery, was told, if he would wait a short time, he would have many opportunities, not only of visiting Fogo, but also the whole group of islands. Five different plans were laid, and each suddenly altered, or set aside. Mr. Bowdich tried to beguile the tediousness of expectation, by inspecting Bona Vista

in all directions, which might easily be done in a fortnight, provided those obstacles were not opposed, which frustrated the greater part of our endeavours.

The geology, botany, and conchology of a place, may always be ascertained by the morning walks of an individual; but to catch fish, shoot birds, *&c.*, it is frequently necessary to have recourse to others. This was our case, and we were obliged to leave the island without satisfying ourselves respecting its ornithology or ichthyology. We saw some large eagles, falcons, and boobies, and a few birds of a smaller kind flying about, but could only procure one or two of the latter. The Governor made us repeated promises, but though we heard his nephew fire for hours, we were invariably informed of his want of success. Mr. Bowdich tried the effect of a few dollars, which prevailed in one or two instances, but to no extent. The fishes seemed to be rare and beautiful, but neither money nor entreaty could prevail on any one to catch them. One day we were told, that the weather was too rough; on another, that our friends the school boys had taken the single fishing boat in the place, on an excursion of pleasure, and it was only by bribing one of Senhor Manoel's cooks, that we were able to examine the two or three mentioned in the appendix to this narrative. All the inhabitants belong to, or are dependant on, Senhor Martins, and it seemed impossible to rouse them from their indifference, or to stimulate them to more exertion than that of their appointed labours. I kept a troop of little ragged boys and girls in pay, to bring me shells, but they would go no further than the immediate precincts of the town, and they all deserted me when I refused to purchase the same shells four or five times over.

The eastern environs of the town appeared to be formed of a conglomerate rock, mingled with basaltic pieces, resting on layers of yellow tufa, coulies running east and west. On the western

sides, the strata lie as follows; three feet of basalt, with coulies running eastward, and lighter coloured upwards, where not washed by the sea; two feet of grit with layers of shells, (apparently an aqueous formation) mingled with sharp, angular pieces of basalt; a thin layer of red earth or tufa, formed from the decomposition of the basalt. The pier rock seems to have a bed of sand underneath it, and below that is a blue compact basalt. The surface of the island is covered with sand, intermingled with patches of conglomerated sand and lime, in which we found innumerable shells. The grit rock also contained shells, and whole masses of the bones of *asteriæ*. The botany presented nothing curious, as will be seen in the appendix. The saline plants were the most abundant, and a Dane once made an experiment to extract alkalies from them, but they did not yield sufficient to make them answer for commerce.

All the quadrupeds were of a domestic kind. Senhor Martins confirmed the account given by Dampier, of the turtles coming from the main land in June, July, and August, to lay their eggs in the sand. There is also a tradition, that by eating the flesh of these animals, and anointing with their blood, leprosy is cured.

The inhabitants of Bona Vista are so well supplied with necessaries, and even luxuries, from Portugal, England, and America, that there is but little encouragement for any manufacturer, particularly as they have no native productions to tempt their industry. There was a black man, however, residing there during my stay, an artisan from the opposite part of the continent, who wove beautiful pagnes or scarves, both of silk and of cotton, being supplied with the material for the former by his employers. His loom was small, after the African fashion, but his web was considerably wider than that of the cloths made on the leeward coast. The patterns, of his own invention, were very pretty, but

did not possess the chaste simplicity of those from Ashantee: nothing could exceed the durability of his manufacture.

The water of Bona Vista is drawn from springs, and always deposits a white sediment. It is reckoned remarkably wholesome, but Mr. Bowdich could not analyze it, as his chemical apparatus had been forwarded to Sierra Leone. The jars which stand in the houses to hold this water, are made at St. Jago, from a porous red clay. I do not think the people at Bona Vista even know how to form a basket, and the island is altogether so barren and uninteresting, that if it did not possess great purity of atmosphere, no one could desire to visit it twice, and no place could be quitted with so little regret*. The salt is of a coarse kind, but cheaper than the finer sort, and is better adapted to some of the African and American markets. It is collected in square, shallow pits, and brought to the shore for lading, by asses. There is no orchil at Bona Vista, although the trade in it is considerable, and almost monopolized by Senhor Martins. It is chiefly procured from St. Antonio†, which is far the most picturesque island in the group, Fogo being formed of one lofty mountain, (said to be as high as Teneriffe) without other scenery.

St. Antonio, I understand, is extremely well wooded, and offers much interest to the botanist. As Mr. Bowdich thought his stay there would probably be very short, he requested the Commandant, who is a great amateur of the science, to make him an herbarium for examination, intending to call for it on his way to Fogo; but this, like every other plan, was frustrated by Senhor

* This completely exemplifies a remark of Baron de Humboldt's, I believe, that "there is more true solitude in sand than in forest." I have lived months at Cape Coast, entirely alone, surrounded by magnificent and solemn woods, without experiencing the cheerless feeling, the sensation of loneliness and desertion, which assailed me whenever I looked out of the window at Bona Vista.

† The collectors are paid threepence per pound.

Manoel's caprice. The higher part of this curious island, till lately, was inaccessible, except by means of a rope which raised and lowered the inhabitants whenever they exchanged visits. A former bishop of St. Jago, who thought it his duty to inspect every part of his see, was drawn up in this manner, and, upon arriving unhurt at the top, gave thanks to God; but not having courage to descend, resolved never to return, and he gave up the world, and died there a few years after. A communication is now formed, by means of a narrow road cut out of the rock. It is only wide enough for one ass, and if two were to meet in it, one must infallibly perish, as they could neither pass each other, nor turn back. To remedy this, a flag is hoisted at either end, as soon as one commences the journey, which being visible at the opposite starting point, warns the inhabitants not to proceed. The climate of the elevated part is supposed to approach that of Lisbon in temperature and purity. The luscious wine of the Cape de Verde Islands, is chiefly made at St. Antonio; it is the colour of Madeira, but resembles mead in taste.

Fogo may be seen from Bona Vista on a very clear day, a distance of about sixty miles. It frequently presents a beautiful spectacle, as the flames are every now and then seen to issue from the top. The ascent did not promise more difficulty than that of Teneriffe, and five days were allotted, as ample time for its complete inspection. We were told much of the enormous quantities of pure sulphur, which lie unheeded at its summit, and which could be made a valuable article of commerce; we were also assured, that the vegetation of the lower part was most luxuriant. All these accounts served but to heighten Mr. Bowdich's wishes, and eventually to increase his disappointment, for after having three times prepared for departure, with the expectation of sailing in two hours, we were at last made happy by an opportunity of proceeding in a vessel belonging to our host, and

touching at St. Antonio, Mayo, &c., were to go to Fogo to embark the bishop, and convey him to St. Jago, where I was to wait till Mr. Bowdich had completed his inspection of the former, he then crossing to me in one of the open boats, which frequently go from Fogo to St. Jago. However, on the arrival of the despatches I have already mentioned, we were coolly told, that the plan was altered, that the vessel must go direct to St. Jago, and that another opportunity was very uncertain. Mr. Bowdich naturally expressed himself in terms of great dissatisfaction at this capricious treatment, and our host, in consequence, tried to make a bargain with a black man (whose vessel, from the River Gambia, was then in the bay) to take us all to Fogo, wait there as many days as might be required, and then convey us to Bathurst; but the black trader talked so much of the correspondents who would be awaiting his return, and was so unwilling to accommodate us by touching at Fogo, that Mr. Bowdich was obliged to relinquish his visit to that island for a time, but fully determined to return by one of our vessels of war, which frequently lie at the Cape de Verde islands during the rainy season on the coast, and with a British authority close to him, and a few dollars, he would probably have met with more success, than when trusting to Portuguese professions, the fulfilment of which was demanded by gratitude, and nothing asked on the score of science and discovery. How cruelly even this project was frustrated, is already known to the world, and I have now only to hope, that Fogo will not long remain unexplored, as I have no doubt that it offers a rich harvest to the scientific traveller, and while Teneriffe boasts of such visitors as Von Buch and de Humboldt, it seems lamentable, that a volcano actually burning, not far distant, and equally accessible, should remain wholly unknown.

Our only alternative was to proceed to the Continent without further delay, and we took our passage direct to Bathurst in the

black man's schooner, in which we were accommodated far beyond our expectations, as it had been fitted up for the short voyages of the English Officers on that station, and was as airy as so small a vessel could well be. When it became dark, however, our troubles began again, for we were actually covered with cock-roaches, spiders, and mice. The mice ate our clothes as well as our provisions, and the cock-roaches poured upon us from every crevice, and settled in such numbers upon my baby, that I was obliged to sit up almost the whole of each night to brush them off; and to add to these disagreeables, the partition from the hold fell down, and the cargo of salt came pouring upon us with such a rushing noise, that as it was too dark to convince my eye-sight, I magnified it into the sea, and gave myself up as lost.

The owner of the vessel had been a slave, and having afterwards procured his freedom, became Captain's steward in a man-of-war. Having served in this capacity some time, at a convenient opportunity he ran away, and finding excellent friends among those who labour for Africa, was enabled to return to the Gambia, where he married, and has since become a respectable trader. But his conduct to us (in exacting enormous passage-money, and taking advantage of our disagreeable situation) evinced a want of principle that disappointed us; and, added to two or three other instances which have come within my knowledge, tended to confirm what must give every friend of Africa some pain to admit, (and indeed, will scarcely be admitted by those who have never visited these people) that the best educated, the most respectable of the present generation of African blacks, appear to have an inherent want of honour and rectitude, which only waits the opportunity to be called forth[s]. This man's livelihood almost

[s] This remark must only be understood as applying to examples hitherto known, where the mistake has been on our own side. There is no instance as yet (save one which I shall mention presently) of any African having been taken from the country

depended upon his character, he enjoyed numerous advantages from the favour of the government at Bathurst, yet he could not

sufficiently early to be unprejudiced by former habits: it is astonishing how soon they imbibe the principles of their fathers; little urchins of five years will glory in thieving from a white man, and in telling him a lie, when, to their own parents they would not on any consideration infringe on truth or honesty. In my opinion, they should be brought from Africa at the age of two or three years, should never be suffered to have any intercourse with their own people while in Europe, and should have a good common education, such as reading, writing, and arithmetic, by all means a knowledge of gardening, and if possible, of agriculture, uniting to these any mechanical trade for which they might shew an inclination. If once they go beyond this, they become wretched on their return home. Naturally indolent from climate and constitution, a sort of despondence creeps upon them from the incongeniality of their neighbours; they become conceited from the comparisons they draw, and too proud and lazy to work, they are at last obliged to submit to the humiliating assistance of others, till they are so entangled with debts, that, hopeless, they become indifferent, and their old habits creeping upon them by degrees, they die black men in principle, manners, and religion. I am very happy to have found one instance which contradicts the notion, that the African race is *incapable* of intellectual acquirement; though I must candidly confess, that till I met with this exception, I was firmly prejudiced against their capability, beyond a certain extent. A girl was taken, at the age of five years, from Congo to Curaçao, in a slave vessel, and was publicly sold there. She fortunately fell into the hands of good people, who taught her to be useful in household duties, and at the age of fourteen went with them to Holland, where she perfected herself in the Dutch language. Misfortunes having befallen her master and mistress, she was by them placed under the protection of the Dutch Government, to prevent her from being carried back to Curaçao to be resold. She could then read, write, and sew, and living afterwards as servant in a Flemish family, she learned to speak their language also. She was next the domestic of an Englishman, who took her to Germany, where, from her knowledge of Flemish, she quickly acquired the language of the country, and subsequently English and French, both of which she reads and writes grammatically; but I am sorry to say, this Englishman attended more to her intellect than her morals, and she had a child by him. When I last saw her, she was keeping her master's house, giving an arithmetical account of all expenses, making the linen required by the family, corresponding with her master (when absent) both in French and English, and, from having associated with her countrymen till the age of fourteen, retained enough of her native tongue to answer any question put to her. I was very much interested for

resist the temptation of making a few dollars, by taking advantage of the pressure of our circumstances, and obliged us to pay more for the short passage to the Gambia, (providing for ourselves) than we gave for the much longer one from Madeira to Bona Vista: unable to navigate his vessel himself, he had employed a Frenchman, and as neither could speak more than a few words of the other's language, mistakes constantly occurred. Of this, the result in one instance, was, that instead of making Porta Praya in St. Jago, where we were to touch for a few hours, we made another point, and went completely round the island, thereby prolonging our voyage three days.

We were not sorry to see St. Jago, which is far more interesting than Bona Vista. The town and forts are situated on the eminences, and a beautiful grove of cocoa-nut trees borders the shore, to the right of the bay. We anchored early in the morning, and Mr. Bowdich immediately went ashore, and despatched emissaries in various directions, for plants and shells, leaving me in the schooner to examine the most perishable, as he sent them on board to me, and to preserve the best. I was also to hail every boat I saw, in the hope of procuring fish, while he went as far as he could with his bag and hammer, to examine and collect specimens of the rocks[h]. We were tolerably successful, as

this poor creature, for she did not revolt my feelings by the usual conceit of her race; on the contrary, she was unassuming, and exceedingly grateful for the notice I took of her and her little forlorn boy, for whose welfare she would be willing to sacrifice every hope and enjoyment, and over whose education and morals she watches with the most earnest solicitude. I was very anxious she should have been attached to one of the schools in Africa, but she was too valuable for her master to part with, and she is now losing the best years of her life, in a situation unworthy of her abilities or good intentions.

[h] These specimens having been mingled with others, I have been unable to separate them, especially, as I did not see them till I was deprived of assistance. An American vessel, trading at St. Jago, returned home half laden with the clay in which the gold is found, by way of experiment; it yielded so much metal, that the vessel

the results of this one day's work will shew to those who peruse the appendix, particularly, as there was but one fishing-boat in the place, which did not make its appearance till five in the afternoon. We managed to depart before sunset, notwithstanding the efforts of the Commandant, who was in his usual state of drunkenness, and whose ill humour, we were told, always increased with the quantity of wine he swallowed. He made the owner of the vessel pay nineteen dollars for port dues, although he did not trade, but merely took in a few planks, and two or three bolts of canvass. After a voyage of twelve days, we reached the River Gambia at night-fall, and proceeding up it, came to anchor at too late an hour to disembark.

On the following morning, Mr. Bowdich presented his letters to the Commandant, (Captain Findlay) who immediately received us all at the Government-House, with the most hospitable kindness. We intended to remain at Bathurst a month, and then proceed to Sierra Leone; but as the River Gambia is so little known to science, Mr. Bowdich lost no time in commencing its survey, and examining its natural productions. When not otherwise employed, he himself made excursions, and in the course of three weeks, the botany of Banjole (the island on which Bathurst stands) was nearly completed, and after Mr. Bowdich's visit to Cape St. Marys, many plants were added from the main land. The usual means were resorted to, of purchasing the birds, shells, &c., brought us by the natives, and every facility was afforded by our countrymen, particularly by the Commandant, whose anxiety for the survey seemed to equal Mr. Bowdich's. The government-boats, and as many men as were required, were

returned for a full cargo, accompanied by two others; but, when the Portuguese Government were, by this proceeding, made sensible of their riches, they forbade any further exportation, although, it would seem, they have never made any use of the clay for themselves.

always in readiness to attend, and although Captain Findlay (who, from six year's residence, was experienced in the baneful effects of the climate) ventured to expostulate on Mr. Bowdich's frequent exposure of himself, he forwarded every scheme, by exerting his power and authority to the utmost.

It was the intention to make a minute and detailed trigonometrical survey, from the mouth of the river to Fort James, taking in the island of Banjole, with drawings to denote the different points particularized in the survey, and to include as much natural history as could be ascertained during the different excursions up and down the river.

Three weeks more were allotted for our stay, and the operations were commenced; first, by Mr. Bowdich's starting early every morning for the nearer points, and returning in the evening, it being a principal object with him to get back to Bathurst at night, for the sake of his astronomical observations, which he was anxious to multiply there as much as possible[1]. Having secured the immediate neighbourhood, he departed for Fort James, where he was absent nearly a week, and where he experienced the first ill effects he had ever felt from the sun. He had been obliged to stand three hours on the top of the fort, waiting for the responses to his signals, in the burning heat of noon-day, which caused the mercury to burst the thermometer, without the smallest shelter. On his return, nothing could induce him to rest, and take any decisive remedy for the constant headach which annoyed him. He even deprived himself of the requisite portion of sleep, and one night, fearing he had slept too long, he started in haste from his bed in a state of profuse perspiration, exposed himself,

[1] The observations were written in Mr. Bowdich's memorandum-book, with initials as references for himself; the sketches of the plan were also rudely drawn, but with so little detail, that he alone could have made use of them; consequently, it has been impossible to profit by his unwearied exertions.

without other covering than a linen dressing gown, to the cold land breeze, in an open gallery, and returned like ice. This circumstance hastened the attack which was hovering over him, and he was seized the next morning with the usual forerunners of fever. Every medical aid was afforded; the most unwearied and thoughtful attention was paid him, night and day, by Captain Findlay, and we flattered ourselves on the appearance of favourable symptoms; but his age and temperate habits, which we hoped would have saved him, served but to lengthen the struggle; they were insufficient to counterbalance his extreme impatience at such an interruption to his pursuits. His desire to recommence his labours was so ardent that even when exhausted to a degree, that we feared recollection had left him, he would call me to his bed side, to know if I thought a week would enable him to be carried about in a hammock, that he might determine the few points left undone. No entreaties, persuasions, or artifices, could dispossess him of this one irritating anxiety, and he closed a life of virtue and honourable activity, on the tenth of January, 1824.

The partial testimony of a wife would gain but little credit with strangers. I do not, therefore, presume to make any comment upon Mr. Bowdich's talents or disposition; neither is it for me to expatiate upon the consequences of the untimely death of one whom Science will unceasingly mourn, as one of the most favoured of her children, and to whose memory she will not fail to pay that tribute, which is never withheld from departed excellence.

As for my own sorrows, were it possible for me to utter them, I have, as a private individual, neither the right nor the inclination to obtrude them upon general notice, conscious that the attempt to make such feelings public must only cast suspicions upon their sincerity.

CHAPTER II.

Bathurst founded.—Situation and Climate of Banjole.—Harmattans.—Description of the town of Bathurst.—Population.—Building stone.—Gillyfree.—Albreda.—Slave dealing.—Mc. Carthy's Island.—Account of the manners and costume of the Joloffs and Mandingoes.—Gold.—Manufactures.—Music.—Dancing.—Horses.—Governments.—Alarms.

THE few general remarks I have to offer upon the settlements of the Gambia, arise from casual observation, and are so trivial, that, if the spot were better known, I should not attempt their publication. The chief good which I can hope to arise from them, will be that of interesting a future traveller to explore further. I must confess, that even I could have done much more under other circumstances; but before Mr. Bowdich's seizure, I was so completely occupied in botanical examinations and Arabic translations, that I had not a moment for any thing else; his fortnight's illness was productive of so much fatigue, that, independent of the great shock I received, total rest was absolutely necessary; and the remainder of my stay was lingered out, not in actual malady, but in a constant struggle to assume such tranquillity as would ensure me mental and bodily strength.

On giving the Island of Goree back to the French, it was the intention to repair Fort James, for the residence of the English,

but it was in so shattered a state, that it was deemed more advisable to establish a new settlement; and most assuredly, had the whole river been searched, a worse situation in point of healthiness, could not have been fixed on, than the Island of Banjole. Its commercial advantages, however, were thought sufficient to counterbalance the evils which had already driven the natives from the place, and the town of Bathurst was founded in 1816.

Much has been done by making dikes, cutting the timber which covered the island, and cultivating the soil; but nothing can ever totally eradicate the insalubrious exhalations arising from its locality. It is so low, that the high tides, which occur in February and March, continually encroach on the sand; and it is probable, that some will hereafter regret having built houses so close upon the shore.

Numerous creeks intersect the island, and when the tide retires, leave stagnant pools; the soil, which reflects back the heat with intensity, is in general sandy, with scattered patches of vegetable mould, but alluvial and marshy in the neighbourhood of the creeks, the half dried margins of which exhale a baneful miasma that alone would generate fever, needing no addition to its poisonous effects from the bad quality of the water. The river, in its whole extent, flows through a thickly-wooded country, and the mangroves penetrate far into its bed on each side; consequently, the return of the tide brings with it a quantity of putrid vegetable matter, which is continually deposited on the banks. The only advantage which this Gambia settlement possesses, is its exposure to the powerful north and north-west winds, blowing directly from the sea. They generally prevail from December till May, but, when the rains commence, in the month of June, the island is deprived of their purifying influence; and it is this temporary privation, admitting the accumulation of morbific prin-

cables, rather than the humidity of the soil, which causes the increase of malady at this period. It generally assails new residents in August, and few are the exceptions among the oldest inhabitants, of the month of October passing, without their being attacked by the fever of the country.

These disadvantages are more or less attendant upon the greater number of our African settlements, but Bathurst possesses an additional danger, which has proved fatal to many; and a painful instance of it occurred during my residence there, in the person of Mr. Malcolm Ritchie, who fell a victim to his indefatigable exertions in the pursuit of his medical profession. This great evil is, the considerable and inconstant range in the thermometer, during the space of twenty-four hours; I have repeatedly seen it as low as 60° at six in the morning, and as high as 90° at mid-day, in the shade. A consumptive constitution, therefore, must not calculate on experiencing that relief at Bathurst, which is so generally found in a warm climate.

The Harmattans, or hot winds from the desert, occurring chiefly in December and January, are severe, and more scorching than those of the leeward coast; they frequently crack tumblers and glass shades, and one, unusually powerful, cracked even the large bell of the barracks. If, therefore, combining the variation of the climate, the locality, the rarity of good soil, with the frequent scarcity of fruit, vegetables, and pasturage, I pronounce Bathurst to be the least healthy of all our African settlements, no one will accuse me of being prejudiced by the misfortune which there befel me.

Since the clearing of the island from its superfluous timber, many pretty houses have been erected, which render the town extremely prepossessing in its appearance from the river*, and

* The annexed drawing, Pl. 10, was taken from the upper veranda of the Government-House. It gives a faithful delineation of the greater part of the barracks,

BATHURST.

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portions of land are granted to those who apply for them, with an expense of a few dollars for the title deed, and on condition that a certain sum shall be laid out in building on the spot, within a given period, and that the space allotted for the street shall not be encroached upon. The public buildings, such as the Hospital[1], the officer's quarters, the soldier's barracks, the Government House, and the prison, have all been raised from the Colonial Fund, formed by the duties of the port; and when this fund is sufficiently increased, further improvements, which are projected, will be carried into execution; such as the continuation of a wall to keep out the high tides, and a market-place, to be built in Mc Carthy's Square, three sides of which now constitute the officer's quarters,

the goal, the officer's quarters, the flag staff, and all the houses of the merchants. The group of figures in front, pourtrays the costume of a mulatto woman and her attendants, dressed for a visit at the Government-House.

[1] I cannot let this opportunity pass of paying a small tribute of gratitude to those benevolent beings who first founded the orders of nuns that attend the hospitals in France. The services of these charitable females are now extended to all the French colonies, and Sir Charles Mc Carthy permitted two to superintend the patients at Bathurst. Perhaps, the superior management of our colonial hospitals, may render them less necessary, and may have induced many to think them superfluous; I have, however, not only heard all those who have been under their care, speak in the most thankful terms of their unwearied attentions, but I can add my own experience. The aid of Sister Marcelline, at Bathurst, was invaluable to me, for after I had sat up eight successive nights with Mr. Bowdich, I was prevailed on to accept her repeated offers of assistance; and she unremittingly persevered in her good offices, during the remainder of my poor husband's illness, although her own health evidently suffered from the exertion. This kind hearted woman belonged to the order of St. Joseph, and wore a bright blue robe, white forehead cloth, and black bib and veil, a costume which admirably became her very handsome face. She told me, that the members of her community professed only for a certain term; that those who went to the colonies, were only such as had volunteered to do so, but that they had bound themselves to remain there five years, after which, they were at liberty like the rest whose term of profession was expired, either to renew their vows, or quit the veil, and even marry if it suited their inclinations.

the barracks, and the prison. Large yards or gardens are generally attached to the houses, and the streets are very wide, tending much to the salubrity and cleanliness of the place, which, notwithstanding its baneful atmosphere, promises to be a settlement of considerable importance, from its great commercial opportunities[m].

The population, according to a census taken a year and a half ago, amounts to 200 souls, independent of servants, strangers, (coming and going at all seasons) and the military force, which generally amounts to 100 men.

The stone used for building appears to be a sandstone, strongly impregnated with oxide of iron, and containing oyster-shells; it is all brought from Dog Island, a few miles further up the river. The lime is made from the abundant oyster-shells, lying in every creek, and a flour-barrel full fetches a dollar; it is even carried to St. Jago, where fuel to make the same quantity would cost two dollars.

The river winds very much in its course, and during the rains, its water is fresh at Jillafree (or Gillyfree), about twenty-five miles from the mouth, where a factory has been established for the inland trade. Albreda, which I understand is picturesque in its situation, is about a mile from it, belongs to the French, and I do

[m] Its principal trade is in gold, timber, hides, bees' wax, and the gum of Portendic, to which may be added several articles of minor consideration. Some idea of the importance of this trade may be formed, when we recollect, that in 1816 there were none but grass and mud huts, and that the merchants now residing there, have built a row of spacious and substantial houses, as may be seen in the plate engraved at the expense of the above merchants. It includes only the front of the town, and the original sketch was taken from the river. Neither this plate, nor my own, contain the two most important buildings, the Government-House, and the hospital, both extensive and handsome edifices. The former cost nine thousand pounds, and like all the rest, was erected without the slightest assistance from government. Bathurst adds to the many extraordinary instances resulting from the exertions of individuals, a spirit which England seems to possess in a more eminent degree than that of any other country.

not hesitate to declare, is a known emporium for slaves and smuggling. The Chief, and only authority there, for he is not to be styled Governor or Commandant, received Mr. Bowdich very hospitably, and offered him more comforts than his means seemed to promise. Slaves are brought by the concealed agents for the trade to Albreda, where they are secreted by the residents, especially in the houses of the French mulattoes, till a French vessel arrives; a frequent event, as a considerable trade is carried on by means of small craft, between Senegal, Goree, and the River Gambia. It is at Albreda that the bargain is struck; but, as all foreign vessels are subject to examination as they pass and repass the town of Bathurst, they do not ship their live cargo till they reach Salem, situated to the north of the river's mouth; where the slaves, having been marched through the bush or forests, meet their purchasers, and are taken thence to supply any market where they are likely to fetch a good price. Several proofs of this occurred during my residence at Bathurst, and one particularly interested me. A very fine boy, named Samba, about twelve years of age, threw himself upon the protection of the Commandant, stating, that he had been purchased by a black woman[a], and taken to Albreda, where he was sold to a Frenchman; and, that in marching to Salem, he had contrived to escape from his guide, and hide himself in the mangroves till he perceived a canoe starting for the opposite side of the river, in which he begged a passage, and on landing at Bathurst, immediately sought safety at

[a] This woman had long been suspected of slave-dealing, and a poor slave girl belonging to her applied to Captain Findlay in my presence, for protection against the ill usage of her mistress, and shewed marks of severe blows. She was of course immediately taken care of, but her owner assembled some friends in the evening, and tried to force her from the person to whom she had been temporarily confided by Captain Findlay. This was previous to Samba's escape, which with other instances, amply justified the seizure of the woman, and she was in confinement when I left

the Government-House, whence he was sent to take up his abode with the other liberated Africans. The truth of his story, with all its details, has been sworn to, and I am sorry to say, is not the only instance of French slaving, to which I have been almost a witness.

James Fort is immediately opposite to Albreda, on an island three-quarters of a mile in extent, and is now a mere ruin. It formerly possessed great strength, and mounted twenty guns, but was blown up by the French[o].

A new settlement has been formed about four hundred miles up the river[p], on an island, supposed to be four leagues long, and called Mc Carthy, in honour of the late Governor-General. It is said to be much more healthy than Bathurst. About twenty soldiers commanded by a serjeant, keep possession of it; and the discharged soldiers of the Second West India Regiment were proceeding thither when I left the Gambia, land having been granted to each, to build on and to cultivate, thus forming a settlement, which, from its situation, is likely to be very flourishing. It already possesses an English factory, and would be a very desirable residence for the scientific traveller, who would there be able to form some rich collections, and make some very valuable observations on an unknown part of Africa, while he would enjoy ample protection, and could reach it without difficulty. A Wesleyan missionary is about to establish a school there, and as he is an amiable, indefatigable man, inured by several years' residence

[o] I was much amused by a perusal of Francis Moore's description of the Gambia, in 1738. It is written with much simplicity, and enables us to compare the former with the present state of affairs. I am sorry to add, that not the slightest improvement seems to have taken place among the natives, since that period, although we have been in possession of the settlements more than a hundred years.

[p] The river is said to be navigable many miles beyond this island, but that *large* vessels cannot even reach this part, in consequence of the bar at Barracunda.

to the climate, and encouraged by unusual progress, little doubt can be entertained of his success.

The black inhabitants of Banjole, are principally from the Joloff country, and followed the English from Goree. They are even more idle than their neighbours, and have no manufactures. I was much struck with their insolent manners, for the Fantees, whom I believe to be as bad as any black nation in Africa, were kept in sufficient order by the small number of Europeans at Cape Coast, to shew at least an outward respect: they never presumed to enter a white man's door without permission, and always lowered the cloth from their left shoulder, as a salute when you met them[q]. At Bathurst, you are liable to their intrusion whenever they please, and if you meet them when walking, they always expect you to turn out of the path for their accommodation. This levelling principle is contended for, as highly contributive to civilization, and I would not pretend to offer my opinion, where there are so many better qualified to judge; but I must urge, that the apparent results are extremely revolting to European feelings. The manners of the people at Cape St. Mary's are so entirely without restraint, that they cannot be ten minutes in your room, without disgusting your senses or your delicacy, and

[q] I would not be understood to place too high a value upon ceremonies of this nature, but form goes a great way with barbarians, and when trifles are allowed, they will soon try to take unpleasant freedoms. I have seen many proofs at the Gambia, of the pernicious effects of the liberty allowed to the black inhabitants, and certainly the feelings of an European female cannot escape some painful shocks. I have now visited the coast from Goree to Accra, and at the Gambia alone have witnessed what could not be reconciled on the scores of barbarity and ignorance. I was the first white woman who had ever been at the town of Naango, in the river Gabon, and there had occasion to punish the insolence, not indecency, of the queen; but once was sufficient, and I was by all others treated with as much deference as if I had been a divinity: of the Ashantees, whom I have received by twenties, when alone in my house, I could not make the smallest complaint.

the filth and nakedness of their children ought at least to be excluded.

For the medicines used by the Mandingoes, and for their vegetable food, I must refer my readers to the Botanical Appendix. Their manner of eating is like that of other blacks, clawing out of the same calabash with their fingers. Most of them profess Mahometanism, and speak Arabic, using the ancient form of salutation, "Peace to thee," now banished among the eastern Arabs[1]. They are tall, slight, but well made, and though not so ugly as the Fantees, are by no means a handsome race, when compared to the Joloffs. The natives of both countries wear very large cloths, or pagnes. The superior classes of Mandingoes, and the travelling Moors of the interior[2], frequently assume a turban, and this, added to their full and graceful pagnes, their red sandals, their elegantly shaped scimitars, and their light bows and arrows, gives them a very picturesque appearance. The older Alcades wear a large, pointed, grass hat, looking like a portion from the thatched roof of their huts, while the younger chiefs have a white cap, beautifully embroidered with coloured cottons, in diamonds, stars, and other devices. The higher class of women generally wear a short shift, and two pagnes of equal size; their gold ornaments are numerous and massy, their ear-rings especially, which are often of such a weight, as to require a string passing over the head to support them, as they would otherwise tear the ears. Natives of all shades, and both countries, assume very dark blue for mourning, and lay aside their ornaments.

The mulatto women, who are mostly Joloffs from Goree, are some of them handsome, and pretend to approach nearer to European manners and customs than those of other parts of Africa; at the same time, they religiously preserve their own superstitions and

[1] See Burckhardt. [2] See Plate 9.

S. Bowdich. del

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ceremonies, some of which are disgusting, and others prejudicial: among the latter, is that of shutting themselves up in a room with every crevice stopped, and a large fire burning during child-birth, and neither mother or infant are allowed to breathe the fresh air under a fortnight. This practice is so totally different from that of other mulatto women, that I have thought it worth mentioning. They wear pagnes like other natives, and as they are generally tall and gracefully formed, look very elegant. They add a covering to the head, which, if it were not so enormously high, would be pretty; it is an assemblage of several square handkerchiefs, (frequently nine) put on much in the way of those of the French peasantry, but rising in a very high cone at the back of the head, and, on state occasions, ornamented with a broad gold band. They generally wear shoes, and those who go without stockings ornament their ancles.

The gold of the Gambia is much softer, and said to be superior to that of the leeward coast. The gold merchants frequently come from great distances, even forcing their way through the country when it is covered with water. They never bring it in its native state, alleging as a motive, that the English would then sow it in their own country, and destroy their market. Their manner of working it is not to be compared with that of the Ashantees, or even Fantees. The Mandingoes use earthen vessels, made from the red clay of their neighbourhood, which are very rude, not glazed, nor exhibiting the beautiful patterns of the Ashantees. Their calabashes are frequently well carved, and filled up with black. They weave ingenious baskets and mats of palm leaves, and they contrive very light stools and bedsteads of bamboo, fastened together with wooden pegs. They also fabricate very neat wooden snuff boxes, for which they have frequent use, taking the most poignant snuff, prepared by themselves, in enormous quantities. Their scimitars and quivers are well sheathed, and

mounted with black and red leather of their own curing and dyeing, and they weave stout cloth from the cotton abounding in their neighbourhood.

Their mirth is usually evinced by noise, called music, and is composed of yells and drums; but they are by no means so barbarous in their calmer moments. They have a sort of guitar, made of a calabash, which I did not see; but their other instrument, the balafon, or balafew, is not unpleasing when well played. It consists of two square frames, with uprights at each corner, supporting the upper frame, and tied together with leathern thongs; on the top are fastened twenty flat bars of hard wood, decreasing in size, and under these are placed small calabashes, with an orifice in each; they are so fastened to the bars, that the orifice is immediately underneath, and the vibration of the bar, when struck, fills the calabash, and causes the sound. The instrument is played with two sticks, having heads, twisted round with cow's intestines. The people do not seem to have any notion of harmony, all their airs being in the same key, and only varying with the formation of the instrument. The first I heard was evidently tuned to A major, but my own approaches to C minor, evidently the effect of chance. I was told, that the Mandingoes have several national songs, but I had no opportunity of hearing any, except the canoe song, which is very pleasing: a few sing the air, after which the whole party joins in the chorus; they are heard when starting from the opposite side of the river, long before they can be distinguished by the eye, and as they gradually approach, the effect is very harmonious. The Mandingo dance, I am told, is not ungraceful; but that of the Joloffs is beyond every thing disgusting. Those who have seen the peasantry and lower classes of Portugal dance, may form some notion of it, although the disgusting attitudes are carried to a greater excess; to those who have never seen any thing of the kind, I cannot

attempt description, but must leave them to imagine contortion of body, carried to the most indecent length.

There is a breed of small horses in Mandingo, which is useful for the saddle, but is never employed for burthens. These animals are tolerably swift, but not remarkably handsome; their chief paces are walking and cantering, both of which are well adapted to the climate; they seldom trot well. The Moors sometimes bring down beautiful, thorough-bred Arabians from the interior, which fetch a great price, even in their native country. The sheep are all wire-haired, and long-legged, but their flesh is well flavoured. The goats give more milk than those further south, and the cows and oxen are of a large size: the former do not give milk after their calves die, and it is the practice to let the calf suck at intervals, milking between each. At certain periods there is plenty of pasturage for the cattle of the island, and ground nut tops make up for any deficiency. The native butter is extremely rancid, and unpleasant to a European palate, from their method of making it; the milk not being sufficiently washed out, which soon turns it sour, and gives it a bad flavour. I tasted some made at Bakkow with a patent churn, by an Englishman, which was equal to that of Europe.

The land on both sides of the river is divided among petty chiefs, who are constantly at war with each other. The King of Coomba is owner of the island of Banjole, and requires more chastisement for his frequent assumption, than our military force on that station is able to inflict. The merchants of Bathurst are kept in constant apprehension by the threatened invasions of the King of Barra, who rules the land immediately opposite. They even deemed it necessary to apply to the Commandant while I was there, to take some precautions against this fearful enemy: the guards were accordingly doubled, and other military preparations made. There was no occasion, however, for any extra

vigilance, for the King kept the peace very strictly all the time I was his neighbour, only making occasional excuses to extort a present of rum, and when his drunken imagination elevated him into a hero, he uttered the threats, which I believe, formed the sole foundation for the fears of the Europeans. One or two false alarms, however, were given, and I was one night awakened by the cry that he was coming, and after passing a few hours, not in apprehension I must say, but in expectation of a bustle, it dwindled to the alarming appearance of two fishing canoes with lights in them, which were thought to approach too near to the town. The second alarm was occasioned by the principal dike giving way, and letting the water flow over the greater part of the island: most of the inhabitants were ignorant of what had happened, but on hearing the bugle sound for all the liberated Africans, or King's boys, to turn out, and seeing Captain Findlay, attended by two other officers, galloping at their head, toward a distant part of the island, the commotion became general, and most of the black people deserted their houses, snatching up their valuables, and were met in all directions, squalling and crying, and running they knew not whither. I suspect his African Majesty has no objection to this terror, as he hopes by it to get an additional share of rum and cloth, to bribe him to tranquillity.

CHAPTER III.

Bakkow.—Government-House.—Town.—Watering Place.—Alcade.—Vegetation.—Arabic.

I MADE an excursion to Bakkow, or Cape St. Mary's, the extreme southern point of the main land at the river's mouth, and was very much struck with the healthiness and superiority of its situation: a house has been built there for convalescent officers, who seldom fail to regain their strength, after a short residence in it. It is exposed to every sea breeze, and sheltered from the winds which blow during the rains. It is of such considerable elevation, even above the town, that all the water must run from it during that season. The soil about it is composed of, what appeared to me to be, red ochreous earth, and covered with a thin layer of sand, probably drifted there by the wind, but it is better a little way from the sea. The only objection is the distance from the spring, which is perhaps a mile from the house; probably, this might be remedied at a considerable expense, by boring a well; but a couple of St. Jago asses could easily carry all the water daily required by a large family.

For commercial purposes, this place would certainly not answer, as there is too much difficulty in getting to it; and its immediate neighbourhood would not afford a sufficient trade: added to this, during a strong wind, or a high tide, the surf beats too violently

against the shore to allow a boat to approach, and I have known people, after reaching the spot, obliged to turn back without landing.

I went with a party by land, and through the bush, or forest, which presented beautiful groups of picturesque trees, and convolvuli hanging luxuriantly from one to another. We reached the first creek, which is of considerable width, and separates Banjole from the continent. A canoe went across to swim our horses, two at a time, and was ferried by the discharged soldiers, who reside in huts on the bank; we then proceeded ourselves, and remounting rode along a flat country to the second creek, where, sheltering ourselves among the mangroves, we waited for a canoe which had been appointed to meet us. Mounting a huge monkey-bread tree, we fired a gun two or three times, which served the double purpose of frightening the crocodiles, and calling the canoe. The entrance to our hiding place was so deep and narrow, that the grooms were obliged to swim and guide the horses. Having all crossed in safety, we again started for Bakkow, and arrived, after as many interruptions as eight miles could well afford.

We remained at the above place one night, which allowed of a visit to the town, consisting of miserable-looking huts, crowded together, filled with smoke, and some not high enough for a middle-sized person to stand upright in[t]. The granaries are mingled with the huts, and the doors fastened with a clumsy wooden bolt, fig. 57, not deserving the name of a lock, and raised on poles, to prevent the encroachments of ants, and other insects. The hall of justice, or palaver house, is higher than the others, with two arched entrances, but would not contain more than ten people sitting close together: it is built of the red earth of the

[t] See PL. 11, drawn from the Veranda of the Government-House.

S. Bowdich del. et lithog.

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BAKKOW.

ROYAL ASIATIC SOCIETY LIBRARY

neighbourhood, and a passage from the Koran is inscribed over each door. The mosque is one of the worst huts in the town.

The watering-place, or spring, looking like a muddy pool, is at the back of the town. We approached it by a path cut through the small wood that surrounds it, and which entirely excluded the light of the full moon. It was perfectly still, and the enormous monkey-bread trees (*Adansonia digitata*) threw their large arms over the lower ones, as if to protect them and the source to which they perhaps owed their massy grandeur. I did all in my power to frighten my female companion, to whom the sound of a wild beast was perfectly new, by rustling the trees close to her, and suggesting the probable attendance of a ferocious escort, not imagining there was so much truth in my pretended fears, for a panther, who was killed on the spot a few nights afterwards, was roaming round the neighbourhood.

Every town has its Alcade or Governor, always subject to the reigning King, who at all interviews demands a present in behalf of his sovereign, and another for himself. The old Alcade at Bakkow, was one of the most rapacious of his tribe, and although he had already received a handsome present, for granting permission to build a *cooking-house*, and form a garden close to the Government-House, he attended at the measurement of the land to secure another; and on its being laid out, and marked for railing-in the next morning, he re-appeared to dispute every inch, in the hope of further extortion. The deposed prince of Barra paid us a visit, who was a fine powerful man in appearance, but extremely forward in deportment, and surrounded by the filthiest black children I ever saw. It is the custom of the country, when a King dies, to change the capital, or rather, every town in the kingdom becomes capital in turn, and its chief Sovereign and great care is always taken of that next in succession. The above prince, thinking he was more powerful than the lawful

successor, tried to secure the throne out of his turn, but being defeated, was obliged to throw himself upon the kindness of the Alcade at Bakkow, both for safety and maintenance.

The Run trees (*corypha minor?*) at Bakkow are numerous, and their tall, straight trunks, without branches, form a beautiful contrast to the monkey-bread trees in their immediate vicinity. One of the latter had fallen down, and the cattle browzing on the plain had found nooks in its rugged trunk, which effectually sheltered them from sun and wind. Nothing conveys so complete an idea of the vast extent, the primitiveness, the solemn grandeur of African scenery, as these stupendous masses of wood; they seem to have been created to shade some race of giants now swept from the face of the earth, and to be left as monuments of the might of those who are passed away. There are some very fine coral trees, with their clusters of brilliant scarlet blossoms, and the whole vegetation is very luxuriant, but not owing much to cultivation[u].

[u] A Committee having been formed by Quakers, for the promotion of civilization in Africa, some of the members arrived at Bathurst while I was there. The plan was to induce a wish for education and improvement, by first trying to make the Africans sensible of the benefits that would accrue to them from a knowledge of agriculture, manufactures, reading, writing, and arithmetic; to establish, in the commencement, a habit of attention, decency, and cleanliness; particularly to avoid presents of spiritous liquors, and not to *insist* upon any change of religion. They had intended forming a colony at Bakkow, and certainly, if any thing of the kind can succeed in Africa, their patient perseverance, their mild and quiet doctrines, their liberal support, their exemplary lives, serving as models, and their hearty zeal in the cause, must have ensured their labours a favourable result. An elderly lady, and a young one, accompanied by two gentlemen, and two educated blacks, had both come out, though possessing ample means and comforts at home, to see what could be done by future visitors or settlers. Nothing could exceed their activity; the younger lady undertook to open a school, and I was astonished at her patience and firm perseverance. Her excellent temper, and her zeal, made her even happy under privations, and a task, of all others the most irksome, and which would have ruined the health and enjoyment

We returned to Bathurst by the beach, and taking advantage of the low tide, were able to ride across the second creek, (the water being only up to our horse's knees) and thereby lessened the difficulties of the path. To those who ride on horseback, the neighbourhood of Bathurst is very easy of access. Frequent shooting parties are made by the gentlemen there, who generally find deer, hares, partridges, pigeons, and guinea-fowls for their sport, and certainly, if it were more healthy, sufficient amusement might be found to render the place agreeable; at low tide the beach is firm enough to ride on, and has even served for a race course.

The little specimens of Arabic literature in the Appendix, were supplied me by Dongo Kary, a native of Senegal, and a learned Marrabout: the originals[x] prove, that the western dialect approaches nearer to the learned Arabic, than the eastern; the character is somewhat different, but not sufficiently so to cause any great difficulty: we understood our Marrabout quite well, and his pronunciation always accorded with the spelling of the word; his accent was not difficult to acquire, and his *Ghrain* was much less guttural than that of the Orientalists.

My readers will easily perceive, from the foregoing little sketch, the difference of customs, the striking inferiority of the inhabitants of this part of Africa, to those north and east of the leeward coast. Mr. Bowdich's "Mission to Ashantee" is a detail

of most women. I am indeed grieved to state, that although the ladies have returned in safety, the gentlemen have both become victims to the fever, but I earnestly trust, that the Committee will not even now be discouraged, but will make a second trial in a situation which affords a better chance for life.

[x] I have been deterred from publishing these originals, from the necessity of having a new type, an expense I could by no means afford, and which would be scarcely worth while for the trifles I have collected; I have, however, drawn the different characters in lithography, and can supply any one who wishes for them, with a large collection of phrases.

of splendour and bravery, accompanied by shrewdness, reflection, and ingenuity, a polish of manner, a taste for arts, and a dexterity of manufacture, shewing an advancement that astonishes us in a people called barbarous.

Whence can this difference arise? Not from their natural productions. The same metals, the same superb vegetation, the same soil, the same climate, exist in both countries. Not from their religion, for what can be more luxurious or splendid than the Musselmen of the East. Not from their greater intercourse with strangers, for there the Mandingoes would have the advantage.

Is it not then a further proof of the Egyptian origin of the Ashantees, suggested by Mr. Bowdich in his Essay on their superstitions, *&c*[y].—a fact which would satisfactorily account for their greater progress towards civilization.

[y] Essay on the Superstitions, Customs, and Arts common to the ancient Egyptians, Abyssinians, and Ashantees, &c., by T. Edward Bowdich, Esq., Conductor of the Mission to Ashantee, &c. &c. Paris, 1821.

APPENDIX.

ZOOLOGY.

I WAS only fortunate enough to procure one monkey, though these animals abound at Banjole, and on the neighbouring continent. It was a variety of the Simia Sabœa, (Lin.) When young, they are of a grayish-brown, but become yellow with age. I saw a very large and ferocious one at a distance, which I think was the Simia Sphynx; and I heard of numbers, marked in a manner wholly unknown; such as a brown body, and a very long tail, with black and white rings.

The small bat of the Gambia belongs to the first tribe of the division Pteropus. It measures, from the end of the muzzle to the tip of the tail, three inches; and from the tip of one wing to the tip of the other, eight inches and a half. The interfemoral membrane is triangular, and reaches to within two lines of the end of the tail. The oreillettes are short and small. It has six small incisors in the lower jaw, and two with very sharp points in the upper. The upper canines reach to the base of the lower canines, and the interval between them and the incisors, is occupied by a wart within the upper lip. The head is flat and shallow, and the whole is of a brown colour.

The stuffed skin of a species of sorex was submitted to our inspection. It was of a gray colour. The tail, which was sub-cylindrical, had only a few scattered hairs upon it, and was two inches and a half long. The body was six inches and a half, and the skin smelt strongly of musk. We at the same time procured the Viverra Zorilla.

We purchased a very interesting little beast for a dollar, whose loss I particularly lament, as he seemed to be quite unknown in Europe. His mouth was so small, that Mr. Bowdich could not examine his teeth while

living, and purposed killing him, but I pleaded so earnestly for his life, that he was spared till we ascertained the probability of finding a second. During this interval Mr. Bowdich was seized with fever, and I had no time or thought for my pet, who one day wandered on to the common, and was bitten by a wild cat. He contrived to crawl up stairs to me, and lay himself down at my feet; I tried every thing I could think of to recover him, but his spine was broken, and he died very shortly after. I put him into a jar of rum, covered him close, and left him for some weeks, at the end of which time, desirous of ascertaining his preservation, I opened the jar, and found that the black boys had drank all the rum, and that my precious specimen was destroyed by vermin. I still hoped to preserve the skeleton, but an officious servant threw it into the river during my absence. This animal was about the size of a small cat, and of a dark gray colour. His fur was very fine, soft, and long; his snout, which was red, was like that of a pig; his ears black, and resembled those of a monkey; his teeth referred him to the family of Carnivora, and his feet, and method of walking, to the group Plantigrada. He took up every thing which he ate with his fore paws, and he did not lap when drinking. He was remarkably docile and affectionate, and suffered my children to pull him about without offering to bite them; he leaped from great heights without fear; he caught rats like a dog, and he followed those he knew everywhere. He constantly accompanied us to dinner at the officer's quarters, and when I desisted going, in consequence of Mr. Bowdich's illness, he went by himself, regularly coming back in the evening to sleep. He loved warmth, and was very impatient of confinement, biting the strong wires of the cage, into which we first put him, so close together that he could slip through the aperture. He had no unpleasant smell, but was very partial to wallowing in every thing wet and dirty. He was a native of Kasimanse. The wild cats who destroyed him, belong to the genus Genetta, and are very numerous, even in the town.

I did not hear of any hyænas, (which abound at Cape Coast) but there are a great many panthers on the main land, though report says there are none in Banjole. I saw several skins, all of which had that appearance, by which we can instantly pronounce them to come from

Africa, *viz.*, the close rows of small roses, the very deep orange of the ground, and the peculiar richness and beauty of the fur.

The store-houses are overrun with the mice and rats of Europe.

Hares are numerous at Bakkow, where there is a considerable portion of open ground; they are smaller than those of Europe, but do not appear to have any other difference.

The elephants confine themselves to the interior, and if we may judge from the size of the teeth brought to Bathurst, they are small in comparison to those further south. The hippopotami are so abundant, as frequently to make it dangerous to pass the river in a boat.

I was informed, that at a little distance up the country, wild boars, deer, and antelopes, are to be seen every day. The rhinoceroses are less frequent. I have already mentioned the breed of horses, (p. 211.) The native oxen have the bunch of fat between the shoulders common to the cattle of Torrid Zones.

Vultur percnopterus? *Gmelin.* Rachamah, *Bruce.* Falco bidentatus, *Lin.*

Aquila.

Wings longer than the tail; head, neck, breast, belly, upper part of the scapularies, and tectrices of the wings, and ends of the remiges of the tail, and feathers of the half-feathered tarsi, white. The rest of the plumage black.

Harpyia—*Cuvier.*

Head and neck white; body brown, speckled with a darker colour; breast brown, speckled with white; the ends of the remiges approach to black; nostrils *very* oblique. The head of the young bird is brown.

alco Occipitalis, *Daud.* Huppart, *Vail: Bruce.*

Astur.

The whole bird of a dusky brown, with bands of a darker colour, which bands are very indistinct on the back; the remiges are nearly black. The belly and thighs are pale brown, with a reddish tinge. From the tip of one wing to the tip of the other, or envergure, 4½ feet. Length from the base of the beak to the tip of the tail, 1 foot 8 inches.

1. Lanius, proper.

Head, throat, half of the breast, back, tail, scapularies, and tectrices, of a brilliant ruby-colour, shaded with violet; remiges of wings and tail, of a deep brown; belly, white; length, 6½ inches. The plumage of the female is a speckled brown. This bird comes to Mandinari (about 11 miles up the River Gambia) only in May, and quits it in June.

2. Lanius—*Division* Plumatæ, *Bowdich.*

Throat, belly, and breast, of a brilliant scarlet. Back and tail of a dark gray, approaching to black; breast and head of a yellowish olive.

3. Lanius—*Division* Plumatæ.

Head, crest, throat, belly, and under pen feathers of the tail, white; back, wings, and upper part of the tail, black. Two of the pens in each wing have a broad rim of white.

4. Lanius, approaching to *Turdus*.

Head yellow, with a black stripe on each side; throat, breast, and belly, of a bright scarlet; wings, back, and tail, black; the upper part of the latter has a greenish tinge.

Tanagra—*Sub-division* Loriots, *Cuv.*

The upper mandible a little more elongated than usual. Top of the head white, speckled with black; upper part of back and wings black; lower part, tail, throat, and belly, of a reddish-brown.

1. Muscicapa—*Division* Tyrannus, *Cuv.*

No hairs at the base of the beak; head and back of an ashy hue; throat and belly, pale brown, wings and tail of an ashy brown; wings mottled with a lighter shade, and each pen edged with the same pale tint. Envergure 10 inches. It is said to feed constantly on carrion.

2. Muscicapa—*Division* Muscipeta, *Cuv.*

Head, throat, belly, under part of tail, tectrices, and upper part of remiges, of a pale verdigris green, slightly tinged with azure; scapularies of a brilliant azure; a patch of azure at the bottom of the back, which is of a reddish brown; the long pens of the tail, green and black; lower part of the remiges of the wing, azure and black.

3. Muscicapa proper, *Cuv.*

Head, throat, back, breast, belly, and under pen feathers of the tail, of a deep brilliant yellow; a black patch round the eye; wings black, tipped with yellow; upper pens of the tail, black. From 8 to 10 inches long.

4. Muscicapa proper, *Cuv.*

The whole bird of a dark gray colour, the throat and belly are tinged with blue, the wings are very dark, and the under pens of the tail are tipped with white. It is the size of an English blackbird.

Turdus.

This bird is like the common thrush, but there are a few hairs at the base of the beak, the fissure of which extends under the eye.

Gracula.

The martin of the Gambia has a very dark green back, belly, wings, and tail; a grey head, a white patch at the bottom of the back, and an ash-coloured throat.

Alauda Africana, *Gmel.*

Pyrgita, *Cuv.*

The head and belly are black; the throat, breast, and tail, of a brilliant scarlet; the wings brown. It is the size of a tit-mouse.

Cocothraustes, *Cuv.*

Upper mandible yellow; lower mandible scarlet. The head is of a dark ash-colour; the back and wings are pale brown; the upper feathers of the tail crimson; the under feathers brown. Throat, breast, and belly, of a pale-ash colour, lower part of the latter tinged with scarlet. A brilliant orange patch under each eye. Length 4 inches.

Icterus.

Head and throat, yellow; tinged with brown; back brown; belly ash coloured; wings brown, edged with yellow; tail the same as the wings.

1. Colaris, *Cuv.*

Head, back, wings, and tail, of a pale brown; belly ash-coloured, tinged with yellow.

Promerops, *Brisson.*

The whole bird of a dark-green colour, with a brilliant metallic lustre, except the belly, which is black, and the throat, which is mottled with brown. The under pens of the wings and tail have each a broad irregular band of white near the tips; legs red. The plumage of this bird approaches it to the Colibris, but its beak is not sufficiently arched for it to belong to that genus.

1. Nectarinia, *Illig.*

The head, back, wings, and tail, are of an ashy brown; the belly white; the throat light brown; and the beak yellow.

2. Nectarinia.

The head violet and azure; the throat, belly, and tail, azure, tinged with violet; the wings and back are of a dark yellow-green. The whole bird has a brilliant metallic lustre.

Colibris, *Cuv.* Trochilus, *Lacépède.*

The head of a brilliant metallic-green, and a patch of the same colour underneath the base of the beak. Throat and breast scarlet, mottled with a dark metallic green; back and belly dark brown; tail and wings light brown.

1. Alcedo, *Lin.*

The throat, breast, and belly, are of a dazzling white; the wings are speckled with green and brown; the crest, head, and back, are green, speckled with white. A white band passes from the nostril to behind the eye. The under pens of the wings are white, with dark-green bands.

2. Alcedo.

The beak is scarlet; the crest of a bright pale blue, striped across with narrow bands of black; head, back, wings, and tail, are of a brilliant azure; the throat is white, and the belly of a light-brown.

A variety of the above had a crest of azure and black, and the sides of the head were of a bright violet, but was in all other respects marked in the same manner. The former is also found in great numbers, near the salt pond, behind Cape Coast.

3. Alcedo.

The upper mandible is scarlet, the lower black; the head, throat, breast, and belly, ash-coloured; the back, upper pen feathers of the tail, and the lower parts of the pens of the wings, of a beautiful dark blue, mixed with a slight tinge of green; outer scapularies black; inner scapularies white.

4. Alcedo.

The top of the head black, with small azure spots; the cheeks of a warm orange-brown. A few azure feathers descend from the commissure toward the throat. Breast and throat, of the same colour as the cheeks; back black, spotted with the most brilliant azure; tail black, slightly tinged with azure; scapularies and tectrices black, spotted with azure; remiges black and brown; the inner scapularies are of an orange-brown; legs red.

Buceros, *Lin.*

The prominence of the beak only reaches to a quarter of its length, where it abruptly terminates; the plumage is entirely black, except under the wings, where it is white.

Picus, *Lin.*

The head is scarlet; the back, wings, and tail, of a pale brown; there are a few scarlet feathers at the bottom of the back; belly and throat ash-coloured.

Pogonias, *Illig.*

Head, back, wings, and tail, of a raven black; a white patch on the middle of the back; throat of a bright crimson; belly mottled with crimson and white.

Psittacus, *Lin.* Parrakeet, *Cuv.*

Corythaix Paulina.

Also found at Sierra Leone. It has a very loud cry.

Numida Meleagris.

Perdix Senegalus.

Columbia, *Lin.*

The head, throat, and breast, are of a pale yellow-green; back and wings, gray, tinged with green; tail gray; each of the tectrices have a yellow rim; the inner pens are of a reddish brown.

Struthio Camelus, *Lin.*

1. Ardea Pavonia, *Lin.*

2. Ardea.

3. Ardea Dubia, *Gmel.* Ardea Algala, *Lath.*

Ciconia, *Cuv.*

Head, breast, and belly, white; scapularies and tectrices of wings white, with bands of reddish violet, toward the end of the feathers; remiges of wings and tail of a very dark yellow-green; back white, tinged with violet; the tarsi are reticulated, and of a yellow colour.

Mycteria, *Lin.*

Upper and lower mandible *both* curved; a membranous skin descends from the forehead just above the eye, and covers the upper mandible for

3¼ inches; one third of the upper mandible is black, and two thirds of the lower red; feathers of the head and neck black; the swelling of the neck, as well as the breast, belly, and one-third of the back, is white; scapularies white; the rest of the bird black; the tarsi have hexagonal, reticular scales; feet black, with the exception of some light shades of red on the metatarsus. Length of beak, 1 foot; of head and neck, 1¼ foot; of body, to the end of the tail, 2 feet; legs, 2 feet 2 inches.

Scopus Umbretta.

1. Ibis.

Tarsi, with hexagonal scales, answering in every respect to Cuvier's description of the Ibis Rel (Tantalus Æthiopicus, *Lath.*): excepting, that the upper mandible surpasses the lower, the eighth part of an inch.

2. Ibis.

Top of the beak red; belly, head, neck, and upper part of the back, ash-coloured; scapularies of a dark metallic-green; tectrices of an olive brown; remiges and tail with an azure tinge.

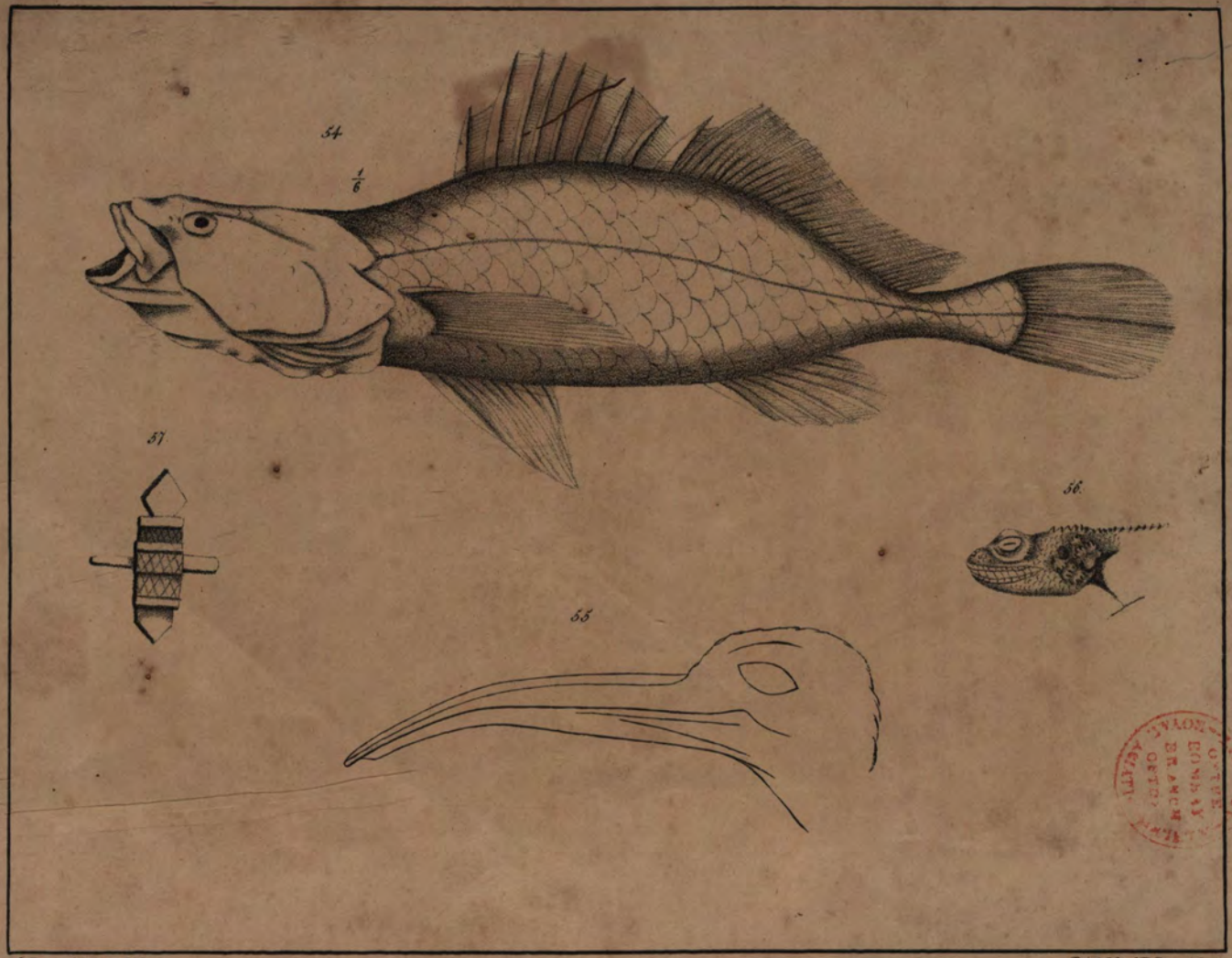
3. Ibis.

Head, upper part, and sides of neck, of a very dark brown, speckled with white; under part of neck white; upper parts of the remiges of the wings of the same colour as the head. The rest of the bird white.

Numenius, *Cuv.*

Jacana, *Briss.* Parra, *Lin.*

The talons remarkably long; throat, breast, and belly, yellow; a black stripe descends from under each eye, they join each other on the throat and look like a necklace; head, back, wings, and tail, of a light brown, mottled with a darker colour; each pen feather of the wings has a yellow edge; length 9 inches. The spur on the wing is scarcely perceptible.



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Phenicopterus, *Lin.*

Larus, *Lin.*

1. Pelecanus, *Lin.*

2. Pelecanus Bassanus, *Lin.* Sula, *Briss.*

Anas Gambensis, *Lin.*

I presume that some of the above species have never yet been described, but I by no means flatter myself with having made any very important discoveries. I had no means of determining the specific names of the greater number, and have therefore minutely detailed all the observations I was able to make, for the assistance of others. Those genera which are neither followed by the name of the species, nor by any remarks, were only seen at too great a distance to note the minutiæ of their plumage.

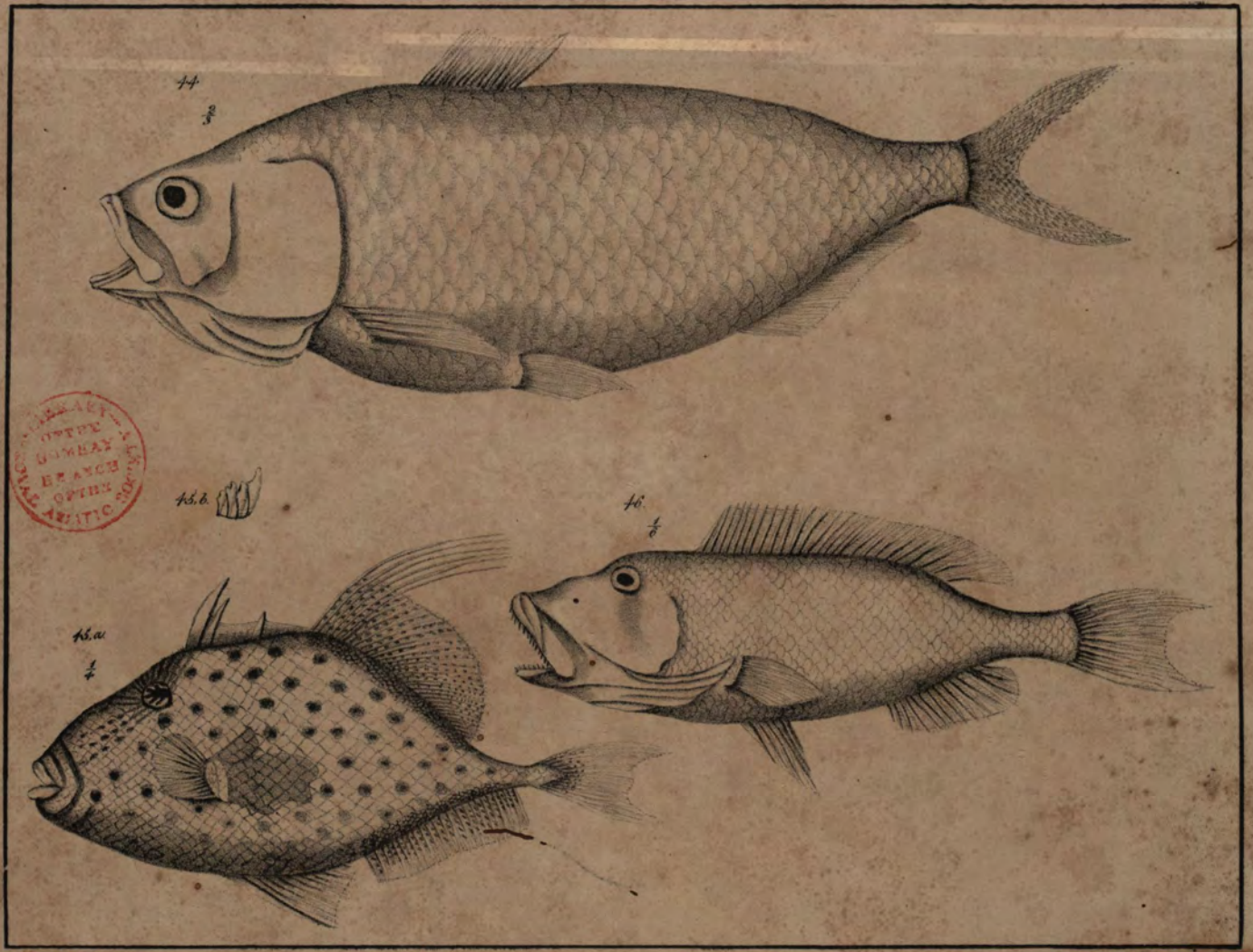
Testudo Mydas, *Lin.*

Crocodilus.

The long muzzle (swelled at the base) of the crocodile of the Gambia certainly approached it to that of St. Domingo, but I did not sufficiently examine it to *decide* on its species. I purchased one during Mr. Bowdich's illness, at his request, but it died and was thrown away, before I even thought of inquiring for it.

Of the numerous lizards running in all directions, within and without the houses, I only noted one, of the head of which I made a drawing, fig. 56. The genus Agama is distinguished by the projecting scales of various parts of the body, and especially near the ears, sometimes in groupes, sometimes isolated. I should therefore think, that my lizard was a *new* species of this genus, *as the groups of scales were inserted upon fleshy* tubercles: the scales of the tail projected. It was one foot long, of a yellowish-brown, slightly tinged with azure on the back; a yellow stripe was on each side of this brown band, then a brown stripe speckled with white and black, which was succeeded by a buff stripe speckled with white; the legs were brown, speckled with white. I heard nothing of the Iguanas which abound at the Isles de Los; of those large, dark gray lizards, with enormous orange crests, which I have so often seen at Cape Coast; or of the Camelions, brought to me in such numbers while on the River Gabon.

The forests of Mandingo are filled with snakes of various kinds, but I only saw that which abounds at Banjole, occasionally coming into the houses, and said to be very venomous. It belonged to the genus Vipera, and was 4 feet 6 inches long; it was of a brown colour, with a narrow yellowish stripe in the middle of the back, and a light indistinct stripe on each side. The belly was of a pale yellow.



OF THE
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Squalus Carcharias?

I had no opportunity of examining the numerous sharks of the Gambia, and neighbouring ocean, but they appeared to be of the species common to all seas.

Tetraodon Lævissimus, *Bowd.*, fig. 18.

This new species of Linnæus's genus Tetraodon has no spines, nor any visible branchial orifice. The back and sides are of a beautiful rose-colour, irregularly marked with a deep black; the belly is of a fleshy hue, and the lips are red; the pectoral fin has 13 rays, and the anal, dorsal, and caudal fins, each 7 rays. It is found at Porta Praya, in the Island of St. Jago.

Balistes Radiata, *Bowd.*, fig. 45.

The ventral fin of this species seems to be more decided than that of any yet known, and probably classes it with the sub-genus Triacanthus of Cuvier. Its distinct rays, 8 in number, and its very strong spine, have so positive an appearance, that we with difficulty admit the generic character of having *no* ventrals. There are two small spines, and a very strong one, in the first dorsal fin, the lower part of which is rayed with blue; the second dorsal has 27 rays, six of which are considerably prolonged beyond the membraneous part of the fin, they are of a yellow colour, and the rest of the fin is spotted with yellow. The caudal fin has 12 branching rays, the pectoral 13, and the anal 25; the latter is of a blue colour, spotted with brown; the body of the fish is gray, spotted with black, and lighter towards the belly. There are two large orange patches, and one white spot behind the pectoral fin; 14 rays of a bright lilac encircle the front of the eye, and there are two rays of the same colour in the iris; three rows of small scales cover the bottom of the second dorsal and anal fins: the teeth are disposed in the manner represented in fig. 45, *b*. Found at Porta Praya.

Hippocampus.

I only saw a dried specimen, which was too carelessly preserved for me to determine the species, but it was of a considerable size.

Clupea Fimbriata, new species, *Bowd.*, fig. 44.

I have given it this specific name, because every scale is fringed, which makes the fish have a very peculiar appearance. The dorsal fin has 16 rays, the ventral 19, and the pectoral 5; the back is of a brilliant azure, the sides are of a pale yellow, and the belly is silvery; the caudal and anal fins are of a deep yellow. Found at Porta Praya.

Esox Belone, *Lin.*

Exocetus.

I did not see any near enough to examine, but they appeared to be very small.

Pimelodus Gambensis, new species, *Bowd.*, fig. 50.

This fish had been long out of the water when we saw it, so that we could only ascertain the existence of the dentated spine of the first dorsal, and of the pectoral fin; and that the second dorsal and anal fins were fleshy. The head, as far as the nape of the neck, was shagreened; there were but few visible scales, and the whole body was of a dull grayish-brown, approaching to black upon the back. It had six *barbillons*, and was found in the Gambia.

Pleuronectes, *Lin.* Solea, *Cuv.* Gambia.

Labrus Iagonensis, new species, *Bowd.*, fig. 47.

Four large teeth project from the front of the upper jaw, behind which is a row *en velours*; the lower jaw has a single row of small, sharp, and regular teeth; the dorsal fin has 25 rays, the pectoral 18, the ventral 8, the anal 14, and the caudal 12; the preoperculum is radiated, and the operculum deeply scalloped; the whole fish is of a brilliant red. Found at Porta Praya and in the Gambia.

Julis Cgrami-marginatus, new species, *Bowd.*, fig. 53.

Every scale of this fish has a thin edge to it; there is one row of small, sharp, irregular teeth in each jaw; the dorsal fin has 9 spines, and 9

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; the pectoral 13, the ventral 7, and the anal 3 spines and 7 rays; the whole fish is silvery, tinged with brown and red, like a carp, except on the belly, where it is orange; the fins and lips are red. It inhabits the River Gambia.

Coryphæna Novacula, *Lin.*

Found at Bona Vista and St. Jago.

Chromis Triacantha, new species, *Bowd.*, fig. 52.

So named from the three spines of its ventral fin; the dorsal fin has 15 spines, and 11 rays; the ventral has 9 rays, besides its 3 spines; the whole fish is of a silvery gray, except the fins, which are orange. Found in the Gambia.

Sparus Sargus, *Lin.* Bona Vista.

Sparus Chromis, *Lin.* Bona Vista.

Dentex Unispinosus, new species, *Bowd.*, fig. 42.

So called from the single free spine in front of the dorsal fin, which has besides 21 rays; the pectoral has 12, the ventral 6, the bases of which are covered with a large scale; the anal has 4 spines and 8 rays, and the caudal 20 rays; bands of small scales pass across the head; the pre-operculum is radiated, and there are 7 small sharp teeth, wide apart in front of each jaw, and on each side of the jaws is a row *en velours*; the whole fish is silvery, slightly tinged with red. Porta Praya.

Dentex Diplodon, new species, *Bowd.*, fig. 46.

The teeth of this new species of Dentex are small and irregular, and set in a double row, the inner row of which is the longest; the dorsal fin has 16 rays and 10 spines, the pectoral 15 rays, the ventral 5 rays and 1 spine, the anal 10 rays and 3 short spines, and the caudal has 15 rays; the whole body of the fish is of a dark silvery gray, with a yellow spot just above the operculum; the fins are yellow, tinged with red. Porta Praya.

Mugil Bispinosus, new species, *Bowd.*, fig. 38.

The lower part of the upper lip is set with small teeth, *en velours*; the first dorsal fin is composed of 4 strong spines, the second of 1 spine and 7 rays, the caudal 14 rays, the pectoral 13, the ventral 6, and the anal 10; the fish is silvery with 8 black stripes; the lateral line is not visible. Bona Vista.

Bodianus Punctatus. Perca Punctata, *Bloch.* Porta Praya.

Bodianus Maculatus, new species, *Bowd.*, fig. 39.

There are numerous sharp-pointed, irregular teeth in each jaw; the dorsal fin has 11 spines and 16 rays, the caudal 14 rays, the anal 2 spines and 10 rays, the ventral 1 spine and 4 rays, the pectoral 16 rays; the pre-operculum is entire, and the operculum has 2 flat spines within the edge; the whole fish is white, *speckled* with black; the scales are very indistinct. Bona Vista.

Pristipoma Humilis, new species, *Bowd.*, fig. 40.

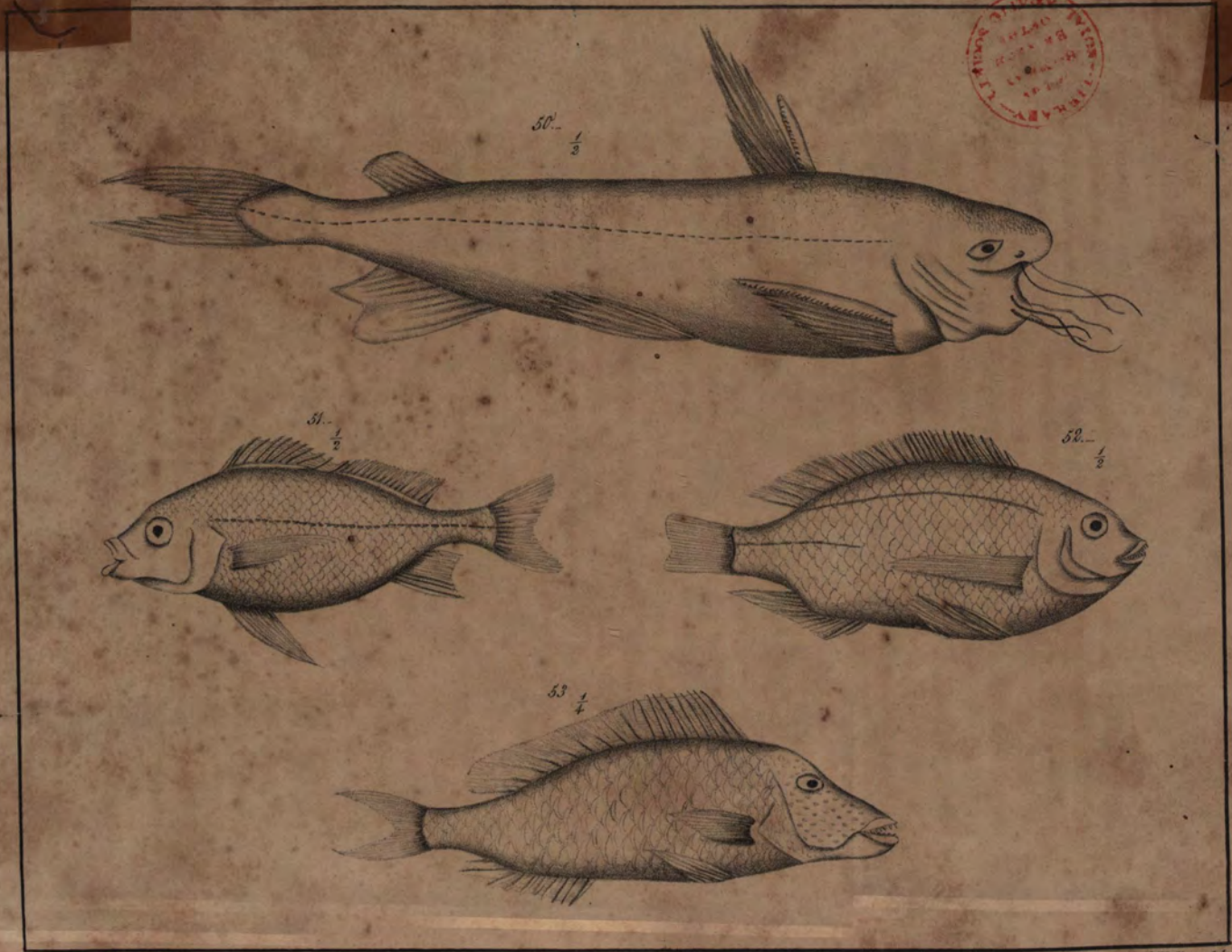
The forehead of this species *has but little elevation;* its teeth are *en velours;* the pre-operculum is finely dentated, the operculum is entire; the dorsal fin has 13 spines and 14 rays, the caudal 18 rays, the anal 2 spines (one very short) and 8 rays, and the ventral 1 spine and 5 rays; the fins and tail are of a pale yellow, the rest of the fish is silvery; two rows of small scales cover the base of the ventral fin. St. Jago and Bona Vista.

Sciæna Elongata, new species, *Bowd.*, fig. 43.

This species bears very closely upon the Sciæna Levistomus of Cuvier, but the spines of the dorsal fin are much stronger, and the *body is considerably elongated;* the dorsal fin has 11 spines, the first of which is very short, and 34 rays; the anal 1 short, and 1 very broad, flat spine, and 6 rays; the colour is a silvery gray tinged with yellow, and the fins are yellow. Porta Praya.

Sciæna Dux, new species, *Bowd.*, fig. 54.

I have thus named it, from its being distinguished by the natives of the



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Gambia, where it abounds, as the captain fish, and where it is much esteemed for the table. There are 4 or 5 small teeth in the front of the upper jaw, the teeth of the lower are *en velours*; the dorsal fin has 9 strong spines and 29 rays, the caudal 18 rays, the anal 1 spine and 7 rays, the ventral 1 spine and 7 rays, and the pectoral 1 spine and 16 rays; the body of the fish is silvery, with an azure tinge on the back, and a red tint near the tail; the anal fin is red, the ventral yellow, and the rest are gray; the scales of the head are indistinct, but those of the body are very large; the lateral line is prolonged to the end of the caudal fin. Gambia.

18. Vomer Brownii, *Cuv.* St. Jago and Gambia.

19. Lichia Tetracantha, new species, *Bowd.*, fig. 49.

The teeth are *en velours*; the pre-operculum is radiated at the edge, and the operculum is slightly undulated; there are 4 *short strong spines* in front of the dorsal fin, to each of which is attached a membrane, so as to give it the appearance of a very small fin; the rest of the fin has 25 rays, the caudal 20, the anal 24, with 2 short spines, the pectoral 14; the scales are scarcely visible; the whole fish has a bright silvery appearance, tinged with a beautiful deep blue. St. Jago and the Gambia.

Fig. 41 and 51 are new genera, both belonging to Cuvier's division Acanthopterygiens, the first part of the dorsal fin being supported by spines, and the anal having one or more spines; they approach nearest to the third family, or the Labroides, from the strength of the spines, and the fleshy lips, but I am at a loss to class them further.

Fig. 51, which I have distinguished by the name of Anomalodon incisus, *has a row of teeth en carde in the upper, and a broad confused band of the same in the lower jaw*; the dorsal fin has 11 strong spines, 3 of which are shorter than the rest, and 15 rays; it is supported by a fleshy ridge; the ventral has 3 spines and 10 rays; the body is silvery, slightly tinged with yellow, and speckled with gray; the back, head, and dorsal fin are gray, the other fins are yellow; the division between the spiny and soft part of the dorsal *is sloped almost to the base*; the opercula are entire; the scales are small, and the lateral line is formed of a ridge of very small projections. Gambia.

The genus which I have called Diastodon Speciosus, *Bowd.*, fig. 41, has 4 *strong irregular teeth very wide apart* in each jaw; the operculs are entire; the dorsal fin has 12 spines and 8 rays; the pectoral 17 rays, the anal 3 spines and 10 rays, the ventral 1 strong spine and 4 rays, and the caudal 17 rays; the lateral line is not visible; the whole fish is of a rose-colour, with shades of violet, which give it a very beautiful appearance. St. Jago.

Fig. 37 is also a new genus, for which I have preserved its native name Seleima, formed of the Portuguese pronoun, *se*, and a corruption of the noun *leme*, a helm, and to which I have added aurata, as a specific appellation, from the golden hue given by the 8 orange stripes. It belongs to the second tribe, of the fourth family of Cuvier's division, Acanthopterygiens. There is a row of small teeth in each jaw; both opercula are entire; the dorsal fin has 10 spines and 17 rays, the pectoral 14 rays, the anal 3 spines and 14 rays, the ventral 1 free spine, 1 adhering, and 5 rays; the caudal 20 rays; the whole fish is silvery, with 8 orange stripes; the lateral line runs along the third stripe. Bona Vista.

A fourth new genus, Amorphocephalus Granulatus, fig. 36, belongs to the fourth tribe, of the same family and division as the preceding. It has 4 strong teeth, set widely apart in the upper jaw; the lower jaw has also 4 strong teeth, but the 2 middle teeth curve, and touch each other at the points; the dorsal fin has 9 spines and 11 branching rays, and is supported by a *granulated* fleshy ridge; the pectoral fin has 16 rays, the ventral 5 and 1 spine, the anal 12 and 1 spine, and the caudal has 16 rays; *the head is very ugly and mis-shapen;* the body is of a violet colour, and the head and fins are of a rose colour. Bona Vista.

All the above fishes, with the exception of the squalus, the tetraodon, the balistes, and the pimelodus, are eaten, but the sciæna dux, or captain fish, is reckoned the best. The sharks of the River Gambia are numerous, but not feared by the natives, for they bathe in the river at all times: they stand much more in dread of a crocodile, which sometimes snaps off a limb. There are a great many beautiful looking fish in the above-mentioned river, and I was very anxious, during the latter part of my stay at Bathurst, to procure them; but the inhabitants could not catch me any, because they had no nets, and materials for making them were not to be found in the settlement.

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The pier rock of Bona Vista was characterized by Vermes, and the Spondylus gæderopus: in the grit rock we found the Cassis testiculus, the same Spondylus as in the pier rock, several species of Fissurella and Patella, and immense quantities of the bones of Asteriæ. Imbedded in the sand, were the Cassis testiculus, the Arca senilis, the Cerithium obelisticus, the Bulla striata, a Conus, a Buccinum, a Chama, and a Purpura. In the tufa, we met with the Arca senilis, the Mactra alba, a Cerithium, a Modiola, and Vermes, all thinly scattered; but there was a very rich deposit in a conglomerate of sand and lime, which abounded at a little distance from the shore. It contained the Cerithium obelisticus, the Cassis testiculus, the Bulla striata, a Natica, a Buccinum, a Conus, the Arca senilis, the Lucina Pennsylvanica, the Tellina lacunosa, a Cardium, probably the isocardia, a Mactra, an alba? a Cypricardia? a Venus, a Solen, and an Ostrea.

The shells which we found at St. Jago and the Gambia, were all in a decidedly recent state, and are contained in the following list, and chiefly named after Lamarck.

Sepia officinalis, Bona Vista.
Balanus tintinnabulum, Gambia.
,, porcatus? attached to the Scutella digitata, Gam.
Anatifera striata: Anatifa, *Lamarck*, Atlantic.
Pholas clausa, *Gray*, Gam.
Solen truncatus, *Wood*, Gam.
,, strigilatus, varietas, Gam. et B. V.
Mactra polita, *Chemnitz*, Gam.
Petricola guinaica, *Gray*, B. V.
Tellina lacunosa, B. V. and St. Jago.
,, nivea, *Chemn.*, Gam.
Lucina squamosa, B. V.
,, Pennsylvanica, B. V.
Donax rugosa, B. V. and Gam.
,, truncata, Gam.

Cytherea tripla, B. V.
„ cincta, var. B. V.
„ corbicula, B. V.
Venus verrucosa, B. V. and St. Jago.
Cardium ringens, B. V.
„ Æolicum, B. V.
„ costatum, Gam.
„ medium, Gam.
„ Isocardia, B. V.
Arca Noæ, B. V.
„ senilis, B. V.
Chama gryphoides, St. J.
Modiola castanea, *Gray*, Gam.
„ sulcata, Gam.
Mytilus achatinus, Gam.
Pinna semi-nuda? *Lam.* B. V.
Perna vulsella, St. J.
Pecten pyxidatus, *Chemn.*, St. J.
„ varius? Gam.
„ imbricatus, B. V.
„ amusium? B. V.
„ gibbus, B. V.
Lima glacialis? B. V.
Spondylus gæderopus, B. V.
Ostrea—Gam.
„ cristola, Gam.
„ folium, Gam.
„ fucorum, B. V.
Siphonaria—Mouret, *Blainville.*
Patella mammillaris, *Linnæus,* B. V.
Fissurella rosea, var? Gam.
„ græca, Gam.
Pileopsis albida, *Gray*, Gam.
Calyptræa chinensis, *Gray*, Gam.
Crepidula porcellana, Gam.

Bulla ampulla, St. J.
„ striata, St. J.
Helix flammea, Mandingo.
Melania Gambensis, *Bowdich*, new species, Gam.
M. testâ turrito-acutâ, fragili tenuique, albâ, striis transversis[a].
Phasianella angulifera, Mandingo.
Nerita striata, B. V.
Natica fulminea, B. V.
„ carnea, *Gray*, St. J.
„ rosea, *Gray*, B. V.
„ collaria? B. V.
„ canrena, B. V.
„ collaris, *Gray*, B. V.
Turritella trisulcata, St. J.
„ ——— species imperfect, St. J.
„ ——— „ „ St. J.
„ ——— „ „ St. J.
Monodonta fragroides? B. V.
Trochus, B. V.
Murex asperimus, St. J.
Triton undosum, B. V.
„ scobiculator, B. V.
Rostellaria fissurella, B. V.
Turbinella cingulata, B. V.
Cerithium granulatum, St. J.
„ obelisticus. B. V.
„ muricatum. Gam.
„ aluco, Gam.
Harpa rosea, St. J.
Nassa reticulata, B. V.
„ lineolata, *Gray*, B. V.
„ conoidea, B. V.

[a] This elegant little shell abounds in every creek of the River Gambia, and with the patellæ, siphonariæ, fissurellæ, calyptræ, and fragments of larger shells, forms complete masses, which bind the sand into hard flakes.

Purpura hamastoma, B. V.
„ Mancinella, B. V.
„ neritoides, B. V.
„ ——— B. V.
Cassis testiculus, B. V. and St. J.
Cypræa zonata, *Gray*, B. V.
„ histrio, Gam.
„ Tigris, Gam.
„ vexillum, St. J.
„ lurida, Gam.
„ Caput Serpentis, Gam.
„ sanguinolentia, Gam.
„ Talpa, Gam.
„ occellata, B. V.
„ erosa, B. V.
„ gangrenosa, *Dilwyn*, Gam.
Oliva acuminata, Gam.
„ hiantula, Gam.
Voluta olla, Gam.
„ zebra, B. V.
„ cymbuim, G.
„ guinaica, G.
Marginella faba, St. J.
„ aurantia, St. J.
„ lineolata, *Gray*, St. J.
„ subcærulea, B. V.
„ gibbosa, B. V.
„ punctulata, *Gray*, B. V.
Colombella ——— B. V.
Strombus pugilis, B. V.
„ vittatus, B. V.
„ lobatus, B. V.
„ giganteus, B. V.
Conus leoninus, B. V.
„ obesus, B. V.

Conus achatinus, B. V.
„ amadis, B. V.
„ nebulosus.
„ vittatus, B. V.
„ monachus, B. V.
„ Testudinarias, B. V[b]
Ovula gibbosa, B. V.
Echinus.
Scutella digitata.

[b] There were several other species of conus, but the shells were too much worn to allow us to determine them.

BOTANY.

BONA VISTA.

Fucus[c].
Kyllingia, new species[d]?
Panicum sericeum, Hab. in Ind. Occidentali.
„ colonum, „ Indiæ cultis.
„ scabrum, „ Senegal.
Cenchrus echinatus, „ Americæ et Barbar. arvis.
Zea mays, (cultivated.)
Asparagus (species imperfect.)
Polygonum salicifolium[e]?
Salsola sativa, Hab. in Hisp. australis maritimis.
„ ——[f].
Salicornia Caspica, Hab. in squalidis maris Caspici, &c.
„ Indica[g] „ ad littera maris Tranquebar.
„ ——[h].

[c] This specimen was very old, and had been apparently laying on the beach a long time; it was black from exposure to air, ligneous, and full of small tubercles.

[d] Culmo cylindrico, involucro universale triphyllo, partiale monophyllo. Valvis capituli, muticis.

[e] The natives call it Froolie, and use its blossoms, which are thickly covered with cotton, for stuffing beds and cushions.

[f] Caule fruticoso, foliis cylindricis, minutis, alternis. This species is, probably, not new, but I could not find it described either in Persoon or Willdenow.

[g] This appears to be a small variety of that found at Tranquebar.

[h] This is used by the natives for making the black liquid with which they mark their salt bags, and which they call morass.

Melissa, (cultivated, species imperfect.)
Mentha, („ „ „)
Marrubium crispum, Hab. in Hispania.
Datura metel[i], Hab. in Asia, Africa, et Ins. Canariis.
Capsicum cerasiforme, (cultivated.)
„ frutescens, („)
Nicotiana pusilla, („)
Solanum mammosum, Hab. in Barbad.
Heliotropium incanum, Hab. in Peru.
Convolvulus batatas, (cultivated.)
„ ——— (species imperfect.)
Asclepias pubescens, Hab. ad C. B. Spei.
Prenanthes ———, new species[k].
Sonchus Goreensis, Hab. in Goree.
Cnicus flavescens, Hab. in Hispania.
Anthemis ———[l].
Sinapis—an brassicata? (cultivated.)
Malva tomentosa, Hab. Ind[m].
„ polystachya, Hab. in Peru.
„ spicata, Hab. in Jamaica, Brasilia.
Sida Canariensis, Hab. in ins. Canariis.
Gossypium Indicum[n], Hab. in India, &c.
Sedum ———, species imperfect[o].

[i] Native name Berbiaca; the calyx is bruised, and applied as a dressing to simple wounds.

[k] Caule racemoso, foliis linearibus, integerrimis, remotis, passim in spinis fortibus mutatis, P. spinosa? *Bowdich.* It seems to me very probable, that the poor and sandy soil of Bona Vista has occasioned the transformation of the leaves of this plant into thorns.

This specimen was very imperfect, but the radius was yellow, and the whole head globose. The leaves were lance-shaped, dentated like a saw, and the whole plant was covered with cotton. This, and the Cnicus, are both given as strengtheners after fever, in the form of an infusion.

[m] The natives call this plant Pontadery; it is one of the ingredients for making the dye Broidge, and a decoction of its roots is given as a cooling drink.

[n] No other use is made of this plant at Bona Vista, than that of squeezing the seeds into water, and then dropping the liquid into the ear, or washing the mouth with it, whenever these parts are affected.

The leaves are bruised for making cataplasms.

Tamarix Africana[p], Hab. in Algeria.
Punica granatum, (cultivated.)
Rosa rubiginosa?
Mimosa glandulosa, Hab. in Mississippi.
Cæsalpinia pulcherrima, Hab. in Barbadoes.
„ ? new species[q].
Cassia, new species, (imperfect[r].)
Elæodendrum argam, Hab. in sylvis Barbariæ.
Ricinus communis, (cultivated.)
Cucurbitus citrullus, (cultivated.)
Cucumis pubescens, an indig.?

Incertæ sedis.

Manoelia pallida, new genus[s]?

[p] A decoction of the young twigs is supposed to be a remedy for the tooth-ache. The shrub is called Taraff.

[q] Caule herbaceo. Foliis impari-pinnatis, pinnulis 8-jugis, foliolis obliquis. Stipulis basin singuli petioli. Staminibus, 10. Legumine ovato. Floribus solitariis, luteis, odoratissimis. Planta inermis, pumila. This is the principal ingredient, among a number of other herbs, used by the natives for dyeing cotton stuffs of a black colour. The herbs are gathered, dried, and burnt; the ashes are then soaked in water for three days, unless it is cool weather, when they are left for a week. The dye is then strained, and the stuff steeped in it for three days; it is then taken out, rinsed in cool water, and dried in the sun. They repeat this process three times before they consider the colour fast.

[r] Foliis obtusis, mucronatis, eglandulosis, 10-jugis, stipulis parvis. Caule suffruticoso. Floribus flavis. Leguminibus oblongis, acuté mucronatis et falcatis. The inhabitants consider it as poisonous.

[s] Classis, 8. Ordo, 1. Lysimachiæ?

Calyx monophyllus, 5-divisus, 5-gonus, corolla regularis, limbo 5-diviso. Stamina 5, lobis corollæ opposita. Stylus unicus. Stigma simplex. Capsula unilocularis, polysperma? Caulis herbaceus. Folia opposita, cum squamulis pluribus. Flores solitarii, axillares. Corolla pallida. Tota planta hirsuta. Manoelia pallida? *Bowdich.*

ST. JAGO.

Bromelia ananas, Hab. in America.
Aloe vulgaris, Hab. in India.
Zea mays, Hab. in America.
Datura Metel, Hab. in Asia, Africa, et in insulis Canariis.
Nicotiana pusilla, an indig. ?
Solanum furiosum.
Heliotropium incanum.
Ocymum integerrimum, Hab. in Ind. Or.
Ipomæa leucantha, Hab. in Amer. torrida.
„ dissecta, Hab. in Guinea.
Convolvulus batatas, Hab. in Ind. utraque.
Mammea ———.
Citrus aurantium, Hab. in India.
„ medica, Hab. in Oriente, et in Eur. meridion.
Gossypium Indicum, Hab. in India.
Hibiscus sabdariffa, Hab. in India.
Malva tomentosa, Hab. in India.
„ spicata, Hab. in Jamaica, Brasilia.
Tamarix Africana.
Cassia occidentalis, Hab. in America.
Cucurbita citrullus, Hab. in Eur. Afr. et Ind.
„ potiro.

Two species have been described by Persoon, the *m. Americana* having four, and the *m. humilis* having three seeds. After examining several fruits of the species at St. Jago, I more frequently found three, but others had only one seed. The fruit is much esteemed, but not plentiful. The length of time before the tree produces fruit, is almost enough to deprive any one of a wish to plant it. Twenty years are generally calculated on by the natives of the leeward coast of Africa, before it becomes serviceable.

BANJOLE AND ITS ENVIRONS.

Ulva bullata.
Fucus capillaris.
Pteris[u].
Arum[x].
Kyllingia umbellata, Hab. in Ind. Or.
,, ———, species imperfect.
,, bulbosa.
Mariscus aphyllus.
Fuirena canescens[y], Hab. in Africa.
Hypælytrum Senegalense, Hab. in Senegal.
Panicum capillare, Hab. in Virginia, &c.
,, milium[z], Hab. in India.
,, colonum[a], Hab. in Indiæ cultis.
Oryza mutica[b].
Sorghum ———.
Cenchrus? ——— [c].

[u] This is the only fern I could find in Banjole. It bears a strong resemblance to the *p. multifidum* from Persia.

[x] None of the Aroideæ were in blossom during my stay at Bathurst, for they spring up immediately after the rains, and disappear again in a fortnight. I determined the genus from the tubercles lying in the sand near the sea-shore; they were all very acrid, blistering the lips severely, if applied to them.

[y] Newly-born children are washed with an infusion of its leaves.

[z] This is eaten by the natives.

[a] This is very like the specimens of *p. colonum*, found by M. Guichenot, at Timor.

[b] The white rice of the Gambia is generally thought to be quite equal to that of Carolina, but in the variety which I examined, the seeds were yellow, flat, and deeply furrowed. When boiled, it turns red.

[c] Flores hermaphroditi. Glumæ unifloræ, 2-valvis, valvulis inæqualibus. Cor. 2-valvis, valvulis inæqualibus. Stam. 3. Styli 2, capillares. Flores densè spicati, cum involucro pilorum violaceorum.

Cenchrus echinatus, Hab. in Porto Rico.
Phleum[d]?
Holcus sorghum[e].
Aristida ———, species imperfect.
Cynosurus ——[f].
Crypsis ———, species imperfect.
Cynodon ——[g].
Dactylis ——, species imperfect.
Eleusine—an cruciata?
Poa reptans.
Gramen[h].
" [i]
" [k]
" [l]
" [m]
" [n]

[d] Glumis maculatis, purpurascentibus, spiculis alternis, lateralibus terminalibusque.

[e] Native name, Couscous. The natives boil it till it becomes a kind of paste, which they eat as we do bread. A dull red dye for cotton is extracted from its stem. It very much resembles the *holcus sorghum* from Coromandel.

[f] The same as that found in the Isle of France by Commerson.

[g] Apparently that species brought by Commerson from Brazil.

[h] Rhachis densè spicata. Spiculæ solitariæ. Glumæ unifloræ, piloso-plumosæ. Cor. 2-valvis, valvulis ferè æqualibus. Styli 2. Stam. 1. Flores hermaphroditi. Cetera ignota. A grass, brought from the Cape of Good Hope by M. Lalande, resembles this very strongly; it is not yet named.

[i] Flores masculi. Glumæ 2-valvis. Cor. 2-valvis. Stam. 3. Densè spicatum.

[k] Flores polygami, cum involucro pilorum rigidorum. Glumæ 1-floræ, 2-valvis, valvulis valdè inæqualibus. Cor. 2-valvis, valvulis inæqualibus.

[l] Flores inferiores hermaphroditi, superiores masculi. Stam. 3. Stylus 1. Rhachis densè spicata.

[m] Flores monoici, cum involucro lanuginoso, et pilis purpurascentibus. Glumæ 2-floræ. Flores superiores fem. infer. masc.

[n] Flores hermaphroditi. Glumæ 1-floræ, 1-valvatæ, muticæ. Cor. 2-valvis, valvulis compressis, inæqualibus, interiori minori, exteriore amplexo. Stam. 3. Styl. 1. Stigmata capillaria. Flores cum involucro plumoso, densè paniculati. Spicula singula fasciculo foliorum parvorum, et folio majore spathæ instar instructa. The native name is Boignfall, and it is thrown into the warm baths used after fevers.

Gramen[o].
Phœnix dactylifera, Hab. in Afr. Orientè, &c.
Raphia vinifera, Hab. in Benin.
Borassus flabelliformis, Hab. in Ind.
Corypha—an minor[p]?
Asparagus officinalis[q], cultivated.
„ falcatus[r], Hab. in Zeylona.
Dioscorea cajanensis[s].
Commelina communis, Hab. in America.
„ erecta, Hab. in Virginia.
Scilla, species imperfect[t].
Musa paradisiça[u], Hab. in utraque India et in Africa.
„ sapientum, Hab. in Amer. Orientale.
Conocarpus, species imperfect[x].
Polygonum bistorta, Hab. in Anglia.
„ ———, species imperfect[y].
Salsola soda, Hab. in Europæ australis salsis.
Beta vulgaris, (cultivated.)
Chenopodium caudatum[z], Hab. in Guinea.
„ multifidum, Hab. in Bonaria.

[o] Flores hermaphroditi. Glumæ nullæ. Cor. 2-valvis, valvulis exterioribus majoribus, navicularibus, interioribus amplectentibus, purpurascentibus. Stam. 2. Styl. 1. Stigmata plumosa. Flores laxè paniculati. Spiculæ imbricatæ. Singulus petiolus cum involucro plumoso.

[p] Native name, Run, signifying strength and a flourishing state. It is very abundant, and makes excellent timber for rafts, beams, &c., because it is not liable to be attacked by worms.

[q] This succeeds better than any European vegetable yet introduced.

[r] Anti-venereal.

[s] This was brought from Sierra Leone, but though it flourishes very well, is little cultivated.

[t] There was no other part of the plant to be found than the bulb, which I think was not large enough for that of the *s. maritima*.

[u] There are very few bananas grown at Bathurst; they chiefly come from the banks of the river.

[x] The fruit is dried, pounded, mixed with water, and given for hardness of the abdomen.

[y] Native name, Senem-contra. It is used as a worm medicine.

[z] Called Koonaky by the Moors, who dry and make an infusion of it, which is taken fasting, as a remedy against worms.

Celosia coccinea [a], Hab. in India.
Amaranthus angustifolius, Hab. ad mare Caspicum.
,, spinosus, Hab. in Indiis.
,, ——— [b].
Centunculus ——— [c].
Piripea, an cœrulea [d]?
Ruellia alopecurioïdea, Hab. in Montserrat.
Ocymum basilicum [e], Hab. in India.
Nepeta multibracteata, Hab. in Atlante, prope Tlemsen.
Mentha citrata.
Perilla, new species [f]?
Brunella, new species [g]?
Scoparia, an dulcis? species imperfect.
Solanum furiosum.
,, Æthiopicum, Hab. in Æthiopia.
,, pomiferum [h].
,, sodomeum, Hab. in Africa.
,, nigrum.
,, Carolinense [i].
Capsicum frutescens, Hab. in India.
,, ——— [k].
Physalis angulata, Hab. in India utraque.
Nicotiana fruticosa [l], Hab. in Vera Cruz.

[a] This, and a white variety, is boiled and eaten with rice, to give an acid flavour.
[b] Foliis ovatis, retusis. Spicis geminatis. Floribus viridibus. Caule articulis rubris.
[c] Foliis hastatis, oppositis, paniculatis.
[d] This is the Piripea brought from Madagascar by Perottet in 1820, and not yet named. I have therefore called it *p. cærulea*, and added the following description. Floribus cœruleis, tribracteatis, paniculatis. Foliis lineari-lanceolatis, oppositis.
[e] A cooling drink, for fevers and coughs, is made with an infusion of this plant.
[f] Foliis linearibus, integerrimis. Bracteis 3, exteriore majore. Floribus lilacinibus. This plant destroys a great deal of corn, by overrunning the plantations.
[g] Valdè hirsuta. Calycibus involucrisque valdè spinosis.
[h] This, and the preceding species, are both eaten.
[i] The leaves are boiled, bruised, and applied outwardly for craw-craw, a species of itch.
[k] Pedunculis 2-aut 4 floris. Fructibus erectis, parvis, oblongis. Foliis lanceolatis, sinuatis.
[l] This is said to be indigenous.

Crescentia cujete.
Convolvulus pentapetaloides, Hab. in Majorca.
„ arvensis.
„ spithameus, Hab. in Virginia.
„ soldanella [m], Hab. in Anglia, Hisp., &c.
„ batatas.
„ lanuginosus, Hab. in Oriente.
„ ——— [n].
„ ——— [o].
„ ——— [p].
„ ——— ——— [q].
Ipomæa involucrata, Hab. in Benin.
Asclepias pubescens [r].
„ gigantea? Hab. in India.
„ laniflora, Hab. in Arabiâ felici.
„ an scandens? species imperfect.
„ lactifera [s], Hab. in Zeylonâ.

[m] It overruns the sea-shore.

[n] An ç *cujanensis?* Foliis quinatis, pedunculis trifloris umbellatisque. Capsulâ, 4-loculari, loculis monospermis. Corollâ albâ. Totâ plantâ valdè hirsutâ.

[o] Corollâ atro-purpurascente. Pedunculo valdè inflato. Caps. obscurè tetragonâ, sæpiùs 3-loculari, seminibus magnis, lateribus compressis, ad hilum maculatis, et odore fœtidâ, embryone magno, viridi, et valdè plicato. Foliis cordatis, acuminatis. Caule volubile, cum squamis parvis, irregularibus. The natives call it Lemmy-lemmy, signifying black lips, and use it as a strong purgative; Mr. Malcolm Ritchie tried it with success in several instances, and in one case administered a large table-spoon full of the powdered seeds, which continued to operate gently, and without pain, for three days. The principal objection to it as a remedy, is the quantity necessary to be taken, as it is very nauseous. I suspect there is more than one species.

[p] Caule prostrato, fruticoso, ramoso. Floribus purpurascentibus, minutis. Pedunculis longis, trifloris, ramosis, axillaribus. Foliis ovatis, lanceolatis, fasciculatis, subtus canescentibus.

[q] Foliis linearibus, glaberrimis, integerrimis. Caule nano, erecto, rubro. Floribus solitariis, flavis, purpurascentibus.

[r] The natives use the root as a violent purgative, and call it Faftan.

[s] The abundant milk flowing from this shrub does not seem to be made use of in this part of the world, as in Peru.

Asclepias parviflora, Hab. in Carolina, Florida, &c.
„ ——[t].
Scævola lobelia, Hab. in Indiis.
Cichorium endivia, (cultivated.)
„ pumilum, („)
Sonchus crassifolius, Hab. in Hispaniâ.
Picris, an asplenioïdes? species imperfect.
Carduus, new species[u].
„ benedictus.
Chrysocoma, species imperfect.
„ reticulata.
„ denticulata[x].
„ linosyris, Hab. in Eur. temp.
Senecio[y].
„ nemorensis.
Arctium[z].
Kuhnia, new species[a].
Elechrysum, new species[b].
Cotula umbellata[c], Hab. ad C. b. sp.
Calendula pluvialis, Hab. ad C. b. sp.
Nacibea, new species[d].
Sarcocephalus esculentus.

[t] An nova species? Foliis oppositis, cordatis. Umbellis axillaribus, viridi-purpurascentibus. Caule volubile.

[u] Foliis amplexicaulibus, lyratis, dentatis, spinosis, pubescentibus. Pedunculis brevibus. Foliolis calycinis teretibus, pinnatifidis, basibus ovatis, adpressis. In appearance, this resembles the c. *marianus* of De Vaillant.

[x] This is dried in the sun, powdered, and given for diseases of the lungs.

[y] Species glabra, floribus purpurascentibus.

[z] Foliis lanceolatis, obsolete serratis, alternis.

[a] Floribus pallidis. Foliis ovatis, ad basin attenuatis. Petiolis longis.

[b] Foliis lanceolatis, sessilibus, ad basin attenuatis. Pedunculis parvis. Floribus axillaribus. Calice rugoso, purpurascente. Receptaculo alveolato. Caule suffrutescente. It is used as a purgative.

[c] Varietas cum umbellis elongatis, subspicatis.

[d] Pedunculis 1-floris. Foliis lineari-lanceolatis, fasciculatis, denticulatis. Calyce 4-fido, ebracteato.

Loranthus Senegalensis.
Pavonia aristata, Hab. in America.
Clematis Chinensis[e].
„ glauca, Hab. in Siberia, Oriente.
Argemone Mexicana.
Brassicæ varietates, (cultivated.)
Raphanus ——— (cultivated.)
Cleome, species imperfect.
„ triphylla, Hab. in Indiis.
Cardiospermum halicacabum, Hab. in Indiis.
Citrus aurantium et varietates[f], Hab. in India.
„ medica et varietates, Hab. in Oriente.
Melia azedirachta aut azadriachta, (cultivated.)
Hermannia, species imperfect.
Hibiscus trionum[g], Hab. in Italia, Africa, &c.
„ hirtus, Hab. in India.
„ vesicarius, Hab. in Africa.
„ tiliaceus, Hab. ad rivos Indiæ.
„ Senegalensis[h].
„ ———, new species[i].
Sida carpinifolia[k], Hab. in Madeira.
„ muricata, Hab. in N. Hispania.
„ Africana, Hab. in Benin.
„ ———, new species[l].

[e] The leaves are made into a plaster, and applied for pains in the back. The same use is made in the Mauritius of the c. *mauritiana*.

[f] The oranges of Mandingo are very inferior to those of the leeward coast.

[g] Native name, Dummodo. The leaf is boiled with rice, to give it an acid flavour. The Moors make a syrup with it for a cough, and call it Basab.

[h] Called Ratach by the natives, and used both as a purgative and worm medicine.

[i] Calycis interioris segmentis basi, glandula parva, rubra, singulâ divisurâ. Caule aspero subaculeato. Foliis rubris, serratis, trilobatis, lobo medio longissimo. Corollâ sulphureâ basi, intus purpurascente.

[k] This species of Sida, which is generally dwarfish, here grows to the size of a large shrub.

[l] Foliis lanceolatis, dentatis, nervis crassis. Floribus flavis, parvis, glomeratis, axillaribus. Tota planta hirsuta. It is called Sany-sany, meaning splendid, or precious, and is supposed to be a remedy against worms.

Adansonia digitata [m], Hab. in Senegal, Ægypto
Bombax pentandrum, Hab. in India utraque.
Anona obovata [n], Hab. in Florida.
Metrosideros umbellata [o] ?
Psidium pyriferum, Hab. in Indiis.
Phaseolus lathyroides, Hab. in Jamaica.
,, species imperfect [p],
,, new species [q] ?
Hedysarum nummularifolium, Hab. in India.
,, new species [r] ?
Æschynomene Indica.
Inga fraxinea.
,, unguis cati.
Cylista comosa [s].
Dolichos ——, species imperfect.
,, pilosus.
,, lablab [t], Hab. in Ægypto.
,, species imperfect.
Tamarindus officinalis.
,, Indicus, Hab. in India, America, &c.

[m] The enormous size of this tree is proverbial. Its fruit has an agreeable acid flavour, and being very abundant, forms a principal article of food among the natives, who season many of their dishes with it, especially a kind of gruel made of corn, and called rooy. It is the only tree which appears to lose its leaves just before the rainy season. Vide plate II.

[n] Native name, Banda. The tree grows to a large size, and the fruit does not seem to be eaten; but as it is exceedingly hard before it is ripe, the boys use it as a ball.

[o] Floribus verticillato-umbellatis. Petalis parvis, rubris, pulcherrimis. Stam. 8, 9, 10. Foliis caulinis ignotis, floralibus parvis Buxi referentibus. Petiolis pubescentibus.

[p] This is an article of food among the natives. The standard was very much twisted with the stamina, in the manner of the Phaseolus, but I could not ascertain its specific characters.

[q] Glabra volubili. Floribus spicatis, flavis, axillaribus. Pedunculis longissimis. Foliis ovatis, acuminatis, alternis. Glandula magna ad basin petiolorum.

[r] Floribus spicatis. Foliis ovatis, binatis, serrulatis. Leguminibus falcatis, 2-articulatis. Stipulis subulatis. Planta herbacea, hirsuta.

[s] Comosa, a manuscript name, given by Solander to a specimen brought by Afzelius.

[t] It overruns the whole island of Banjole, and the Moors call it Natoo. They boil the seeds with goat's fat to make an ointment, which they rub on the skin to cure flatulence.

Abrus precatoris, Hab. in India.
Detarium Senegalense.
Cytisus cajan, Hab. in Zeylona.
Arachis hypogea[u], Hab. in utraque Ind. Afr.
Cassia occidentalis[x], Hab. in America.
,, acuminata, Hab. in Guyanæ sylvis.
,, fistula, Hab. in India, Ægypto, &c.
Moringa arabica[y], Hab. in Arabia.
Indigofera trifoliata, Hab. in India.
,, stricta, Hab. ad C. b. spei.
,, frustescens[z], Hab. ad C. b. spei.
Guilandina bonducella[a], Hab. in Indiis.
Robinia flava[b], Hab. in borealis imperii Sinensè.
Lathyrus, species imperfect[c].
Erythrina picta, Hab. in India.
Glycine apios, Hab. in Virginia.
Medicago falcata.
Favolus glaber.
Genus Legumen[d].

[u] The horses of the Gambia are said to be better, stronger, and to live longer than those of the other parts of the coast, owing to the superior quality of this plant, which forms their principal food, and is given to them in a dry state.

[x] This plant seems to be the panacea of the Mandingoes, who call it Bantamara. Its seeds are roasted, and used instead of coffee. The warm baths given for all disorders, have a quantity of these leaves thrown into them. They are said entirely to cure rheumatism, and in all fever cases the bodies of the patients are rubbed with them.

[y] The leaves are beaten, and applied to bruises, and also boiled in the water used for baths.

[z] I could not ascertain which species is preferred for dyeing, but they all seem to be free from the destructive insect so fatal to the crops of indigo in the West Indies.

[a] Called Koory, signifying "collected into one." The fruit is said to be good for ulceration of the throat, and glandular swellings. The leaf is boiled in water with sugar, and the decoction given as a gargle.

[b] Et varietas floribus albis. The wood of this variety is that chosen for tooth-picks.

[c] Named Nboom, soaked in water, and the infusion drank for bowel complaints.

[d] Staminibus distinctis. Foliis obovatis, glabris. Calyce hirsuto. Floribus laxè paniculatis. Arbor altissima, similis *Pultenææ*. Native name Ven. The wood is as hard as mahogany, but never grows to a large circumference. It is much used for small beams and rafters.

Mimosa asperata, Hab. in Jamaica.
„ Nilotica.
„ ——— species imperfect[e].
Hymenæa courbaril[f].
Securidaca erecta, Hab. in Hispaniolæ saxosis.
Mangifera ———[g].
Elæodendrum argam[h], Hab. inter fluminis Tansif et Suz.
Rhamnus cassinoides, Hab. ad St. Dominicam.
Samara floribunda[i], Hab. ad pratorum Cajennæ et Guyennæ.
Euphorbia ———, new species[k],
Ricinus viridis[l], Hab. in India.
Jatropha manihot, Hab. in Amer. aust.
Cucurbita citrullus[m], (cultivated.)
„ Potiro.
„ pepo, Hab. in Oriente.
„ idolatrica, Hab. in Guinea.
„ umbellata, Hab. in India.
„ mammeata? species imperfect.
Cucumis melo, (cultivated.)
vulgaris[n], (cultivated.)
„ lineata, Hab. in Gujana.
Bryonia ———, species imperfect.

[e] This herbaceous Mimosa is bruised, boiled, and used instead of soap.

[f] The natives make all their charcoal from this tree.

[g] Foliis pinnatis, foliolis alternis. Drupa sub-reniformi. Native name Detta.

[h] Native name Gunsodake. It is supposed to be antiscorbutic.

[i] Flores non vidi. S. floribundæ similis habitu, et foliis obovatis. There are two trees of it on the island, which are so large as to serve for land-marks when navigating the river.

[k] Calyce parvo. Caule dichotomo. Floribus axillaribus. Foliis obliquis, ovatis, obtusis, subtus canescentibus, stipulis minutis. • Planta lacteseens.

[l] An infusion of the root is taken fasting for worms, and is called by the Moors, Badasabalas.

[m] This grows to an immense size. A variety from St. Jago is propagated in preference, as it is devoid of sweetness. The only botanical difference is, that its leaves have three lobes instead of five.

[n] Both this and the *c. melo* produce good fruit, but it is difficult to preserve it till it reaches maturity, for it is always attacked by worms.

Ficus polita [o]? Hab. in Guinea.
„ nitida, Hab. in India.
„ terebrata [p], Hab. in insul. Mauritiis.
parasitica, Hab. in India.

Incertæ sedis

1. Classis 8. Ordo 1. Lysimachiæ.

Calyx monophyllus, tubulosus, quinque-fidus, persistens, hirsutus, pilis basi dilatata, glandulosa, viscosa. Corolla regularis, tubulosa, alba, limbo quinque-lobo, lobis mucronatis. Stamina quinque, inserta corollæ, et ejusdem lobis opposita. Antheræ violaceæ. Germen superum. Stylus unicus. Stigma quinquefidum. Capsula pentagona, mono aut polysperma, unilocularis. Flores tribracteati, (bracteis hastatis) spicati, terminales, et axillares. Caulis suffruticosus. Folia lanceolata, glabra, repanda, alterna, petiolis brevibus.

Findlaya alba? *Bowdich.*

2. Classis 8. Ordo 3. Acanthaceæ?

Calyx monophyllus, 4-divisus, unibracteatus. Corolla violacea, irregularis, hypogyna, 4-fida, singulo lobo sinuato. Stamina 2. Stylus 1. Stigma simplex. Fructus superus, capsularis, bilocularis, polyspermus. Folia opposita, ovata. Caulis herbaceus. Flores in spicis imbricatis, axillaribus. Tota planta hirsuta.

Banjolea violacea? *Bowdich.*

3. Classis 8. Ordo—an affinis Jasmineæ aut Oleineæ.

Calyx tubulosus, 6-fidus, cum 2-bracteis, aut 8-fidus. Corolla hypogyna, lutea, 1-petala, 4-fida, regularis. Stamina 4, inserta corollæ, et ejusdem limbum æquantia. Antheræ violaceæ. Fructus globosus, drupaceus, nuce fragili, 1 sperma, 7-sulcata. Flores aggregati, subcorymbosi, termi-

[o] The old leaves of this tree were quite rough, and the young ones perfectly smooth.
[p] The natives assert, that they procure a substance like Caoutchouc from this tree.

nales. Folia alterna, glaberrima, uninervia, cordata, ad basin attenuata. Arbor magna.

Keiria lutea? *Bowdich.*

4. Classis 8. Ordo 4. Jasmineæ?

Calyx tubulosus, 4-fidus. Corolla tubulosa, regularis, tubo longo, et limbo 4-lobo, lobis lanceolatis. Stamina 4, intrà tubum. Stylus 1. Stigma ignotum. Fructus superus, dispermus. Herba tenuissima, pulcherrima, Flores laxatè paniculati. Corolla intùs alba, sed extùs rosea. Folia linearia fasciculata.

Duvaucellia tenuis? *Bowdich.*

5. Classis 8. Ordo 6. Labiateæ?

Calyx semi-ventricosus, bilabiatus, labio superiori majore, utroque 3-lobo, lobis spinosis. Corolla bilabiata, labium superiùs integrum, magnum, incurvatum, villosum, inferiùs 3-fidum. Stam. 4, didynama, inclusa. Stigma *simplex.* Semina 4, nuda. Flores capitati—verticillati, bracteati, bracteis linearibus. Corolla alba. Caulis sulcatus, racemosus. Folia cordata, dentata, petiolata, fasciculata.

6. Classis 8. Ordo 6. Labiateæ?

Calyx 1-phyllus, 4-fidus. Calículo parvo, 5-dentato, dentibus acutis. Corolla bilabiata, labium superiùs reflexum, 3-dentatum, inferiùs 3-dentatum, denti medio longissimo. Stam. 2, exserta, 2-abortiva? Flores fasciculati, axillares. Corolla pallidè violacea. Caulis petioli et calyces hirsuti. Folia glaberrima, magna, acuminata, petiolis longis.

7. Classis 8. Ordo 7. Scrophulariæ.

Calyx tubulosus, profundè divisus, divisionibus 2, majoribus, purpurascentibus. Tubus brevis. Corolla tubulosa, longa, cylindrica, irregularis, limbo 5-diviso, divisionibus 3, conniventibus, fornicatis. Stamina 4, didynama. Stylus 1, Stig. simplex. Folia terna. Corolla alba. Flores capitati.

8. Classis 8. Ordo 10. Convolvulaceæ?

Calyx persistens, 5-divisus, calicibo multiplo, aut profundè dentato. Corolla ignota. Capsula multilocularis, locularis 10? 2-spermis. Semina receptaculo centrali adherentia. Folia cordata, acuminata. Pedunculi foliis oppositi. Cetera ignota.

9. Classis 11. Ordo 2. Rubiaceæ?

Calyx 1-phyllus, superus 4-fidus. Corolla tubo longo, limbo 4-diviso, reflexo. Stamina 4. Antheræ sessiles. Stigma bifidum. Capsula Nacibeæ. Flores corymbosi, pedunculis longis, axillaribus. Corolla rosea, pulcherrima. Caulis herbaceus. Folia lanceolata, opposita.

10. Classis 11. Ordo 3. Caprifoliaceæ?

Calyx 1-phyllus, superus brevis, obscurè 5-dentatus, bibracteatus. Corolla tubulosa, 5-fida, tubo longissimo gracili. Stam. 5, non exserta, Antheræ violaceæ. Stylus 1. Stig. simplex. Flores fasciculati, axillares. Folia lanceolata, opposita, coriacea, odorata. Fructus ignotus. Interdum parasitica.

Coddingtonia parasitica? *Bowdich.*

11. Classis 14. Ordo 11. Leguminoseæ?

Calyx 5-divisus, divisionibus profundis, acuminatis. Corolla 5-petala, sub-irregularis. Vexillum majus. Stam. 10, distincta, curvata. Antheræ longæ, inæquales. Legumen compressum, marginatum, ovatum, parvum. Folia simpliciter pinnata, alterna, multijuga. Stipulæ 2, lanceolatæ. Corolla flava. Caulis ramis gracilibus, pubescens.

12. Classis 14. Ordo 11. Leguminoseæ?

Calyx 5-divisus, divisionibus profundis. Corolla regularis, 5-petala. Stamina 10, approximata, diadelpha. Stylus curvatus. Pedunculi bi aut triflores, axillares. Legumen oblongum, compressum, polyspermum, torulosum. Folia simpliciter pinnata, 2-stipulata. Caulis herbaceus, tenuis. Corolla flava.

13. Classis 14. Ordo 13. Rhamnoideæ?

Genus propè Rhamnum, Paliurum, et Elæodendrum, sed diversum *styli* 2. Drupa nuce ossea, 3 loculare, bispinosa. Folia ovata, acuminata, trinervia, pubescentia.

14. Classis 15. Ordo 1. Euphorbiaceæ?

Dioica. Mascula ignota.

Fem. Calyx 5-partitus, patens, divisionibus ovatis, striatis, pallidè viridis. Corolla nulla. Corona minima, rubra, annularis, crenulata, in imo calycis. Germ. superum cylindricum, sex-costatum. Fructus ignotus, sed germen triloculare, trispermum. Flores paniculati, terminales. Pedunculi biflores. Folia alterna, trilobata, stipitata, sinibus profundis. Petioli 3, stipuliformibus[r].

15. Classis 15. Ordo 2. Cucurbitaceæ?

Dioïca. Mascula. Calyx 5-fidus. Corolla 5-petala, rotata, flava. Stam. 5. Antheræ spiraliter contortæ, filamenta distincta. Flores umbellati. Folia hastata, 5-lobata. Caulis contortus, volubilis. Fem. ignota[s].

16. Arbor Magna.

Fructibus drupaceis, nucibus, duris, axillaribus, pedunculatis, 1-spermis, odoratis. Foliis ovatis, acuminatis, subtùs reticulatis, alternis, petiolatis. Cetera ignota.

17. Arbor Mimosæ similis.

Floribus minutis, flavis, paniculatis. Pedunculis caulequè aculeatis, spinis solitariis. Foliis pinnatis.

18. Herba.

Calyx 1-phyllus, 5-fidus, divisionibus lanceolatis. Cor. 5-petala, flava,

[q] The root of this shrub is used by the natives as ipecacuanha, which quality approaches it to the *rhamnus catharticus*. It has two native names, Sedem and Bouqui.

[r] A honey drop lodges in each division of the calyx, and the stigmata are imbued with a strong viscous juice. It is a beautiful shrub, and yields a rich fragrance.

[s] I was told, that the fruit is eaten when young, and tastes, and looks, like a young cucumber.

epigyna. Stam. 5, alterna cum petalis. Stylus 1. Stig. simplex. Caps. carnosa, 2-locularis, seminibus minutis, receptaculis carnosis. Flores umbellati, axillares, petiolis longis. Folia sessilia, fasciculata, opposita, lineari-lanceolata. Caulis suffruticosus. Tota planta villosa[†].

19. Arbor.

Calyx 1-phyllus, 4-fidus. Corolla ignota. Stam. ignota. Stylus 1. Germen superum. Caps. cum placentâ centrali, polysperma. Semina minuta. Folia ovata, ad basin attenuata, succulenta, opposita, nervo medio crasso. Flores corymbosi, 2-bracteati. Caulis cicatricibus foliorum notatus.

20. Arbor.

Calyx superus, campanulatus, 5-fidus. Petala nulla. Squamæ 5, calyci insertæ. Stam. 5. Styl. 1. Stig. capitatum. Flores in spicis terminalibus. Folia opposita, ovata, mucronata, ad basin attenuata.

21. Arbor.

Fructibus in paniculis terminalibus. Calyx persistens, 5-fidus. Capsulæ inferæ, longæ, trigonæ, striatæ, calyce persistente coronatæ, 1-loculares. Folia opposita, ovata, ad basin attenuata.

22. Herba.

Calyx 1-phyllus, 4-divisionibus, profundis, lanceolatis. Corolla vel 1-petala, 12-partita, aut 12-petala. Stam. numerosa, inæqualia, filamenta longa, receptaculo inserta. Antheræ longæ, sulcatæ. Receptaculum poculiformi-crenulatum, et 12-striatum. Stig. globosum, sessile. Germen inferum. Capsulæ 12, aggregatæ, polyspermæ. Cor. albâ. Antheræ et receptaculum flavæ. Planta herbacea, humilis.

23. Herba scandens.

Calyx 3-phyllus. Cor. 3-petala. Stam. ignota. Styl. ignotus. Stig. 3,

[†] The natives make a decoction of its leaves, and give it as a drink in fever cases.

persistentia. Caps. 3, superæ, polyspermæ. Folia alterna, cordiformia, acuminata. Flores spicati. Corolla virides. Cetera ignota [u].

24. Arbuscula.

Calyx 5-divisus. Corolla flava 5-divisa. Capsula 3 locularis, muricata, loculis monospermis. Flores axillares et terminales. Folia alterna, angulata, serrata, trilobata, odoratissima. Cetera ignota.

25. Arbor.

Calyx 1-phyllus, trilobatus. Fructus globosus, glaber, coriaceus, trivalvis, polyspermus, 7-sulcatus, calyce persistente coronatus. Sem. compressa, plana, flavâ, pulpâ carnosâ et albâ cinctâ. Folia sub-rotunda, 5-nervata, opposita, glabra, nitida, subtùs pubescentia, fasciculata, petiolis longis, rami dichotomi. Cetera ignota.

26. Arbor.

Samara unilocularis, 1-sperma, compressa, ovata, alâ circumdatâ. Fructus fasciculatè pendulis. Folia mucronata, ad basin attenuata, subalternâ ramis. An Terminalia?

27. Arbor altissima.

Capsula globosa, coriacea, punctata, dehiscens, 4-valvis à placenta centrali solutis. Sem. compressa, numerosa, imbricata. Loculus unus, interdùm abortives. Folia pari-pinnata, 4-juga. Foliola ovata, mucronata, obsoletè undulata [x].

[u] The Joloff name is Picé, the Moorish, Bakkis Seferie. The root is soaked in water, in the proportion of three inches length to a quart, which makes a very bitter infusion, and is said by the French residents to be a successful remedy against jaundice.

[x] This is the tree that produces the mahogany of the River Gambia, and seems to be different to that of Sierra Leone, if we compare it with the description which immediately follows. They both grow in Mandingo, but the wood of the Gambia tree is said to be very superior to that of Sierra Leone. The natives call it Khai, and it is so heavy, that when fresh cut, it immediately sinks in water, but rises after a time.

28. Arbor altissima.

Calyx 1-phyllus, 5-divisus, divisionibus lanceolatis, profundis. Petala 5, lanceolata minuta. Stam. 7, hypogyna, aut perigyna. Stylus 1. Stig. simplex. Pedunculi 2 aut 3 flores. Flores corymbosi, 1-bracteati, odoratissimi. Folia obovatè uninervata, integerrima.

29. Arbor Sambuci similis.

Calyx persistens, 5-phyllus. Caps. quadricoccâ, rostrata, coriacea, sicca dehiscens. Cocci placentæ centrali non adherentes. Semina 4, ad basin placentæ insidentia, trigona, hirsuta. Pedunculus triflorus. Folia magna, ovata, acuminata, ad basin cordata, petiolata [y].

30. Arbor.

Drupa extùs coriacea, intùs carnosa, nuce 2-loculata, 2-sperma. Semina lanugine fuscâ, densâ, immersa. Cicatrix magna, ad hilum seminum. Folia lanceolata, cordata, uninervata, subsessiliâ, subtùs reticulata [z].

31. Calyx 5-lobatus.

Baccâ minuta, multilocularis, polysperma, calyce persistente coronata. Folia integerrima, ovata, lanceolata, an pinnata [a]?

32. Arbor fœtida.

Calyx 4-fidus, seu 4-phyllus, inferus. Cor. ignota. Stamina 6-7, hypogyna, cum margine membranacea. Folia ovata, ad basin attenuata. Flores paniculati, terminales. Pedunculi bi aut tri flores. Caulis ramosus, semi-angulosus.

33. Arbuscula.

Drupa carnosa, parva et nigra, calyce persistente coronata, nucibus

[y] An infusion of the leaves is given by the natives, to fatten those reduced by illness.

[z] This is called the Mandingo plum, and is much eaten by the natives. It has an insipid, mealy taste. The wood of the tree is said to be the best in the country for fuel.

[a] The appearance of this genus refers it to the aurantiæ, and from the anastomization of its cells, it is probably new.

2-sulcatus. Bracteæ 2. Pedunculi dichotomi. Flores fasciculati, axillares. Folia magna, opposita, lanceolata, acuminata, ad basin attenuata. Cetera ignota.

34.

Calyx inferus, 2-3 fidus, dentatus urceolatus. Cor. 5-petala, regularis. Stamina 10, inæqualia. Ovarium, aut unicum, stigmatibus sessilibus coronatum, et profundè sulcatum, aut ovaria plurima. Folia ovata, integerrima. Corolla flava. Flores fasciculati, axillares. Rami tortuosi.

35. Arbor.

Capsula quadricocca, unilocularis, propter valvas ad medium capsulæ non extendentes. Capsula 4-alata. Folia opposita, ovata, acuminata. Pedunculi axillares.

36. Herba.

Calyx persistens, superus, campanulatus. Corolla, an monopetala, seu 4-petala, lutea. Stam. plurima. Styli 4. Stig. totidem. Germen inferum. Fructus 4-coccus, coccis rostratis, connatis dehiscentibus, 2-3 spermis. Semina hirsuta. Pedunculi ramosi, axillares. Folia cordata, acuminata, subtùs canescentia.

My Botanical List is much less complete than I had expected it would be. I took great pains to make it so, but the one fatal event which blighted all my other hopes, in a great measure frustrated even these endeavours, added to which, the disastrous circumstances of my last voyage bereft me of the aid I had expected to find in Europe.

Immediately after the rains cease between the tropics, vegetation is in its full vigour, but a great portion of it is so fugaceous, that a fortnight will deprive the botanist of many beautiful and delicate plants. Unfortunately, we did not reach Bathurst till the end of November, two months after the rains had terminated. Many faded and broken specimens were brought to me, of which I took notes, hoping, at Mr. Bowdich's second visit, to procure, not only the perfect plants, but those which we had missed by our late arrival. I preserved a numerous collection as vouchers for my veracity, and, disappointed in all other respects, was returning with a splendid herbarium, carefully packed in a case which seemed impenetrable. The vessel in which I returned was so overladen, and consequently, so deep in the water, that, as we had a succession of storms, from the moment we made the Azores till we reached Dover, her deck was incessantly afloat; the water penetrated, and most of my property was destroyed. To examine the luggage in the hold was impossible, and it would have availed nothing if I could have secured my plants in my cabin, for I was there driven three times from my birth by the torrents of water which set every thing swimming, and which left me nothing but wet bedding to sleep on during the last fortnight. I was fearful that much destruction had taken place, but, when I went to the docks, to select the articles liable to duty, I can scarcely express my mortification, at seeing many of my valuable books, and entire drawings, but above all, my dried plants, dropped in atoms. I was thus disabled from comparing my [redacted] with the magnificent collections of England and France. I can now do with my new, or imperfect genera, [redacted] them as notes for any future traveller.

With [redacted] which I profess to have determined, I offer them.

with some degree of confidence, for, since my return, I have re-examined my notes, and the remnants of my specimens, amid the collection in the Jardin du Roi, and have scarcely had a single instance to alter. My books of reference, both for species and localities, have been Persoon and Willdenow. At the end of each name, I have added the country to which the plant has been hitherto supposed to be indigenous, that an idea may be formed of the similitude of vegetation, and I have given the uses made of it by the natives. They were all gathered in a soil more or less sandy, and on a level with the sea, except those from St. Jago, which are too few to admit of any observation.

It has been remarked by M. Palisot de Beauvois, in his Flora of Benin and Owaree, that the natives of Africa more frequently make their medicines from Compositæ, than any other family. This is by no means the case with the Joloffs and Mandingoes; their remedies seem to be distributed throughout the different families, and the only remarkable circumstance attending them, is the frequency of their antidotes against worms, and lung complaints. The variation of the climate accounts for the necessity of the latter, but their food, which is chiefly rice and corn, without any great proportion of fruit, does not seem to induce the former disorder. The guinea worm I believe to be wholly unknown; nor did I see a single instance of enlarged spleen, or elephantiasis, so frequent among the Fantees.

TRANSLATIONS FROM THE ARABIC.

The method pursued with the following translations, (which are as literal as the difference of the two languages will allow them to be), was to inquire of our Marrabout, Dongo Kary, for the most interesting traditions of his own country. He accordingly brought us the manuscripts in Arabic, which we translated, and then, as he spoke English very tolerably, we read them to him for the sake of his corrections. For their veracity then I can safely vouch, but still retain the originals, for the inspection of those who may be desirous of other proof than that of my assertion. I could not publish them, as the expense of a new type would have been beyond my means. The difference of character, however, is presented to the public in the annexed lithographic plate. The pronunciations of Richardson, De Sacy, and Ellious Bochtor, (the Copt who was interpreter to the French army in Egypt) are given on the right of each letter, and the African on the left. One or two of the differences have been noticed by De Sacy, but the rest are now published for the first time.

The western dialect (as I have already stated) approaches nearer to the learned Arabic than the modern Oriental, but our half-enlightened Moors rarely understand the pure language in all its inflexions and forms, and their want of knowledge in this respect renders their manuscripts very puzzling. For instance, they frequently use the word "kala," which is the third person singular, of the preterite, (or root) not only for "he said," which is the real signification, but for they said, they say, I say, I said, &c. Nor are they more exact in their formation of the plural number, which at all times is difficult in the Arabic. For example, they write "radjoul" for men, as well as man; "radjal" I believe is the occidental substitution for the oriental plural "nasoo." Great confusion also arises from their omission of servile letters, when they ought to be inserted as radicals,

Pronunciation		Pronunciation	
Alef	Alif / Elef	Dsad	Dad / Dhad / Ddad
Ba	Ba / Bè	Dta	Ta / Tha / Tta
Ja	Dja / Jè	Dsa	Da / Dha / Zza
Tsa	Tha / Tsa / Tsè	Haï	Aïn / Aën
Dyha	Jim / Djim	Ghraïn	Ghain / Graën
Ha	Kha / Ha	Fa	Fa / Fé
Cha	Kha / Dha	Kaf	Kaf / Dkaf
Dal		Kaf	Kaf / Kef / Cef
Sal, Dsal	Dhsal / Dzal / Dsal	Lam	
Ra	Ra / Ré	Mim	
Dsa	Za / Zéin	Noon	Nun / Noun
Sin		Wa	
Tsin	Shin / Schin	Ha, ta fem: Hé fem.:	
Tsad	Sad / Ssad	Ja	
		La	Lam / Lamalif / Lammalif

and they increase the perplexity by the absence of the sign " teschdid." In the word " ma," water, they insert the " hamza," but do not seem aware of its import: the " gesma" occurs frequently. All these difficulties, however, are easily combatted by a thorough knowledge of the language in its most perfect state, and I should recommend Lokman's fables as an excellent preparatory book. The simplicity, the style of narration, the personification, and dialogues, all struck me as strongly resembling Dongo Kary's histories, which were not composed by himself, but have been delivered from father to son, through a long succession of Marrabouts. There are doubtless several idioms which have crept in from the Mediterranean, but which are chiefly confined to words rather than construction, and are therefore easily detected. We were in some measure prepared for them, by having collected a number of manuscript phrases used in the Levant, and on the Northern Coast of Africa, but we found them to be much more rare than we expected.

The astonishment expressed by the Marrabout at seeing me write, not only my own language, but his also, was very entertaining; as the knowledge of the Moorish females is confined to the repetition of the hymn and common prayer; and when I explained the "hamza" to him, he exclaimed, as on every other wonderful occasion, " white man and woman do every thing; your country pass ours."

It will be seen by the translations, that the religious traditions of African Moors are confused and imperfect. Glimpses of the truth are mingled with their own romantic notions, and so long as they ascribe the highest honours to Mohammed, they care little for consistence of circumstance, or connexion of events. The expressions used by our Marrabout were frequently so ludicrous, that we could not avoid smiling, or even laughing, and the seriousness with which he uttered them, added to the effect caused by his having lost an eye, and by his enormous bush of woolly hair, which stuck out from his head in every direction. He would frequently argue with us on the respective merits of our religions, and I was surprised by his correct acquaintance with the christian tenets, and his high opinion of their charitable tendency. He invariably confessed the divinity of our Saviour, as a prophet, and placed him in rank next to Mahomet.

The common prayer is used as an introduction to all other Marrabout prayers, or to any religious discourse.

The story of Joseph differs so much from the Hebrew version, that I have thought it worth relating, in nearly the words of my friend Dongo Kary. The transformation of Benjamin into a sister, the royalty of Joseph, the father's recognition of him by his garments, &c., have all formed it into a romantic history, which is ended in the true African style, that of the running away of Joseph's brethren into the bush, and there turning into wild men.

I have also a manuscript history of the kingdom of Kayor, but it is so deficient of interest, being a list of names and places, and the number of moons that the kings "sat down," (reigned) that I did not venture on its publication.

The Pagan story of the monkeys is common on the leeward coast, and in the Bight of Benin, and I have no doubt has lost much in the translation, for the natives of those countries have infinite humour, and having often watched them secretly, when they have been sitting in a circle, on the ramparts of the fortress, I can imagine that they personate the scolding and afterwards repentant wife, and hen-pecked husband, to the life. On one occasion I had planted myself behind a cannon close to them, when they were telling a ghost story; and on seeing, by the light of the moon, that horror and alarm had seized the audience, it struck me, that as I was clothed in white, I might act the ghost. I accordingly threw my scarf over my head, and mounted on the gun-carriage; and as I slowly appeared, they uttered one yell, and in an instant I had the rampart to myself, nor could any persuasion tempt them to assemble on that spot again.

THE CREATION.

Before all things, God made himself a splendid dwelling in the heavens. He made the sacred books, Tanrat or Moses, Yandjal or Job, Foorkan or Mohammed, and Saboor or David; and the pen with which he wrote them was called "Moonwelkalami.

He made the angels, and four of them were to command over the rest. First, Gabriel, who helped to make the earth and sea; Michael, who rules over the rain, and keeps it in his charge; Assarafiloo, who takes care of the souls, and Osarailo, who is to sound the trumpet at the day of judgment, when all will rise.

He also made these prophets, Adam, Abraham, Moses, Mohammed, Jesus Christ, and Ababakoor; but Mohammed was created directly after Gabriel, upon which God rested for 300 years without making any thing, and Gabriel thought he was the only being besides the Creator, but he happened to meet Mohammed, and exclaimed, "I am disappointed, I thought to rule over every thing, but now I see this being, I must inquire of God which he made first; if me, then I shall still rule." He went to God with this salutation, "I think God is master of every thing. King, my master, you are every where." Upon which God said, "Why have you quitted the spot I put you in?" Gabriel then asked the above question, and God remained silent, and Gabriel stood in expectation 300 years, saying, "Oh, thou father, Oh, thou father." Then God said, "Silence you, you know well that I have not yet made the world, and I could not make it as I intend, unless I had made Mohammed first; neither heaven, nor the fire, nor the devil, nor sea, nor moon, nor stars, nor beasts." God created seven heavens, and seven fires. The first heaven is for God himself, where at the judgment-day will be admitted, Mohammed, Jesus Christ, Abraham, and Moses, with the angel Eytoof, who serves God alone, and is the only angel not commanded by Gabriel. All these heavens are lighted brightly by the radiance from the above prophets, who receive it from God. The first hell or fire, called Djanama, is destined to those Marrabouts, who, having learned to read, and been qualified to know God, afterwards fail in their duty, or commit evil.

God is said to have created Adam of sand, without any soul, and Ybleess, or the great devil, having been made previously, found him lying down, and despised him, saying, "This is mere sand, shall it presume to be a companion for me?" And he spate upon Adam. God hearing this, instantly gave Adam a soul, who rose, and being angry, tried to throw a ball of sand at Ybleess, and said, "I will not serve him." For doing all this, God turned Ybleess out of heaven, but took

Adam there, and kept him 300 years, when he created Howa, a woman, for him, and they were permitted to eat of every thing in heaven, but one sort of fruit. Adam knew Ybleess from the above circumstance, but Howa did not. Ybleess feeling his soul on fire, went and demanded of God, payment or reward for all the prayers and good works which he had performed in his previous life, and God asked him what pay he wanted. Ybleess replied, "I want company in the fire," and God answered, "Go then, and try to make people wicked if you can, but I shall not make people to put them in the fire, for the sake of keeping you company." Ybleess then thanked him, and went to Howa, to whom he said, "All the fruit in heaven is good, but this passes (surpasses) every other, why then do you not eat of it? Howa said, "My husband told me not." Ybleess returned, "Your husband deceives you, God never said so, for it is the best fruit of all, and Adam wants it for another woman." "But there is no other woman." "Yes, there is; but you have been kept ignorant of her existence." Howa then ate three fruits, and took two more, which she put under the pillow of the bed, and then charged Adam with the other woman. Adam swore it was false, and Howa replied, "Swear not, but eat of this fruit, and I will believe." He began to eat, and God sent Gabriel to prevent him. Gabriel seized Adam by the throat, to prevent his swallowing it (which made man have what is called Adam's apple). God then told Ybleess, if any one met him they might kill him. God called Adam three times, and said, "For this which you have done, I must create one earthly world for your descendants, for you and they will be unfit for heaven now; and you must descend to this earth, where you will find trouble every day, and even that which you think good will prove to be evil. Go to it then." God then sent him a little book called Chosan, and told him to go and wash, and to wash his heart first, then to pray; and said, "You must die, but after death you shall come to heaven."

God began to make the world on a Friday, and finished it on the Wednesday; Thursday he rested. Friday is to be the day of judgment, and when that same Friday comes, it will last 300 years, and there will be rain for ten years, to destroy the world before the judgment.

THE DELUGE.

There were a great many wicked people, but Noah was a good man, and a prophet among them, and had a wife named Djooliaka, and one very wicked son, who was very powerful. Djooliaka was also very bad, and a scoffer of God, and Noah felt compelled to pray for a deluge and a new world. He began to pray on a Friday, and the angel Gabriel came on the following Friday, and said, that God would grant the deluge. Noah then built a large ship, and wrote God's and his own name upon every plank, and Sitani (a minor devil) licked out the names. Noah in his distress prayed to God, who sent him a dog, (then created for the first time) who kept off Sitani by trying to bite him. Noah was three months making the ship, and three days collecting every thing, male and female, that had life. The deluge lasted 300 years, and it was very cold. When Noah thought it time to descend from the ark, he called the little pigeon "as big as his little finger," named Rammatto, and which could fly seven weeks without stopping, and asked him if the rain had ceased, and Rammatto said, "you must call and ask the sun," and Noah then told him to get up, and go into the sky, and if he came back to alight at Mecca. Rammatto, flying to the east, near Mecca, there discovered the first dry land, and took Noah back some of the grass; Noah seeing that, went out, and built a large city. And the beasts came out, stood, and walked about, and lived in the ark no more; but when Noah's son Habil killed his brother, they all ran away, and said, "We are no longer safe, for man would kill us more readily than his brother; therefore, let us avoid him." Hence the fear and avoiding of man by animals, and their living in the bush.

THE COMMON PRAYER.

In the name of God, health for every body that has a soul. Recompense to good people at the day of judgment. Thanks to God the master of every thing. King of judgment, we pray to you to give us time to do what we wish. We ought to do according to your law. Your law is right. God help every body to do what is right. He will not then be angry with them. Amen.

HYMN.

One thousand two hundred and thirty years and six moons are gone since Mahomet went. Every body knows this. Our day of labour is done, our night of sleep is passed. Every thing which we make must be spread on a hide (that every body may see it). If the young boy makes, if the old man makes, leaving out nothing, still we must fear God; to do away the bad things done before we lived. Do right quickly. All things pass away except God, who must remain for ever.

THE HISTORY OF JOSEPH.

Joseph had twenty-nine brothers, and he dreamed that he represented the stars, and when he told this to his father and mother, they replied, "Say this no more, for fear of your brothers," but the by-standers repeated it; and his brothers asked him, "Are you to be our master?" and Joseph replied, "What God sends I take, but as yet I know not." The brothers then seized him, put him into a bucket, and let him down into a well thirty feet deep, on pretence of his being better able to get water than they, who were bigger. God told him not to cry, for that would do him no good. The father and mother cried till they were blind. Joseph remained one year in the well, being supported in it by God.

At the end of that time, a man came with camels and oxen to drink, and seeing Joseph (who still preserved "his old little garment") a very fine young man, he made a slave of him, and sold him to Pharaoh for camels and gum.

Joseph soon rose to the charge of every thing in the house, but Pharaoh put him into prison from caprice, and from the apprehension that he was spoiled by indulgence, though Joseph had not done any wrong. He was kept there one year, with two men slaves. A person named Wahd, came to look at them. One of his fellow-prisoners said, "Joseph dreamed last night that a famine will come, and if the king does not take care, it will destroy all, and the king will have a dangerous sickness. I pray you go tell the king to take one bullock, to kill him, and to cook him for the poor, then God will help him in his sickness." Wahd told the king. Joseph's fellow prisoners were sent for and questioned, and they confirmed the story. Joseph was then unfettered, and the king said to him, "You are a stranger, you must keep my keys, all my other servants being born here." The king then said to the others, "All obey this man, and you will please me." Every day Joseph gave out one cup of corn, and every day put a similar one into the store, in anticipation of the famine about which he had dreamed, and he did this for three months. Pharoah had three hundred wives. One wife "took a liking to Joseph, but he refused her embraces, the king heard the noise and came, and Joseph refused to explain, saying, "God has seen and knows, and he is enough for me." Pharoah had sent him away four days, when a councillor of the king's suggested, that he should ascertain if the fragment of linen, left in the woman's hand, belonged to the fore or the hinder part of Joseph's shirt; if the former, it was Joseph's attempt, if the latter, it was torn by the woman when holding him unwillingly. In this manner Joseph was acquitted, the keys were returned to him, and he again laid up the corn. The famine arrived, and at the end of seven years there was no corn left, but what was in the store. He was applied to for food, and there was a plentiful supply.

The famine lasted seven years more, and then the king died. The people wanted to make Joseph king. He was sent for, and advised of it by the council, but he said, "I know nothing of such affairs, I am

only a slave, but before you make me king, all people must pay what they owed to the last king for provisions, that I may give it for the support of his children, and you must make all the people swear, that they have wished and ordered you to make me king." He then gave the people all the corn that was left, and they liked him very much.

Soon there came another famine, (elsewhere) and nineteen of his brothers came to Misr, (or Cairo) to try and get something to eat. Joseph then asked them where they lived, and they told him in Hinda, and he knew them, though they did not recognise him; he however relieved them, and secretly put his "own little clothes," and a cup, into a sack of corn, and sent the whole to the old blind man and woman for charity. The old people took out the cup and clothes, kissed, and smelt them, and the scent of the garments cured their blindness, but they still feigned it, as they were afraid of their sons. The old people sent their sons again to King Joseph, to thank him for the corn, and to present him with a basket for a curiosity, it having been made by a blind man. In the side the old man secreted a letter, in which he reminded Joseph, that his youngest sister, an infant when he left home, was now a woman. When Joseph received this, he loaded the camels and gave his brothers much more corn, and sent a message to the blind people, desiring them to send their youngest child. They did so, saying to her secretly, "that king is your brother, but speak not of it on the road, for fear the others should kill you." When they arrived, Joseph feasted his brethren handsomely in his bed-room, and sent the girl to feed with the servants. The brothers reviled Joseph for this, and for frustrating their sister's expectations as a female; (meaning that he ought to have taken her for a wife) and they got up and took her away with them, but Joseph secretly put two large pieces of silver into the girl's basket, and then, pretending to have discovered a robbery, sent after her, found the silver in her basket, and detained her, telling the brothers to go and fetch the old man and woman. He then gave his sister fine clothes and rings, and had her bathed.

The brothers went back to the old people, and said, "Your daughter is in prison, you must come." When they reached Misr, Joseph pretended to put them in prison also. He then invited his brothers to a

feast, and had his parents and sister splendidly dressed, and brought in as spectators. Upon this the brothers recognised father, mother, sister, and Joseph, and ran away in consternation and shame to the bush. Joseph sought them for three years, to beg them to come back, and to assure them of his forgiveness. The messenger then returned and said, "I have found these people, but they have no longer any clothes, except those made of grass, and they have become wild, and will not return."

This history is not in the Koran, because it happened previous to the making of that book.

THE ORIGIN OF MONKIES.

There was once a big and a strong man, who was by profession a cook; he courted a lady living in the same place with himself, and who was of a rank superior to his own. She accepted his offer, on condition, that she should never be asked to enter the cooking-house, but have a dwelling prepared for her at some little distance. They were accordingly married, and to her great indignation, she was led to the kitchen as her only apartment; however, not willing so soon to make her husband unhappy, she submitted in silence, but seeing no prospect of any alteration, she at length began to complain. Her remonstrances were at first unheeded, but when they became violent and incessant, the man quieted her by saying, that he would go to the bush and fetch wood to build the promised house. He went, and brought home a little in a few hours. The next morning, the wife urged him to renew his labours, and he went, and after staying all day, again returned with a small quantity, which so exasperated the wife, that she took the biggest of the sticks and beat him well. The man then went a third time, but staid all night, and when he repaired to his home, excused himself for returning empty handed, by saying, that he had cut down some large trees, and could only bring them part of the distance, as they were so heavy. The day after, he professed to go to the bush to complete his task, and then staid two days and two nights, which made the wife so unhappy, that when he came back to her, she cried and begged him not to leave her, and that

she was contented to live in the cooking-house all her life, rather than lose him. But by this time he liked the bush so much, that he replied, "No, you made me go to the bush, now I like the bush, and shall go and stop there always;" and breaking from her, fled to the forest, where he became a monkey, or a wild man, and from him descended all other monkies.

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